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ORIGINAL COMMUNICATIONS.

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SYMPOSIUM OF PAPERS READ AT A SCIENTIFIC MEETING OF THE SURGICAL STAFF OF DR. WENDELL C. PHILLIPS' CLINIC, MANHATTAN EYE, EAR AND THROAT HOSPITAL, NEW YORK, APRIL, 1906.

OCULAR MANIFESTATIONS IN INTRA-CRANIAL DISEASES OF OTITIC ORIGIN.*

BY W. E. SPICER, M.D., NEW YORK.

Von Grafe[1] was the first to recognize the connection between optic neuritis and affections of the brain. Zanfal says that an extension of the inflammation from the middle ear into the cranial cavity may be revealed at a time when distinct violent subjective symptoms, or other symptoms, are not yet present. The influence of trepanation on the cranial conditions can be most plainly observed in the subsidence of the papillary and retinal changes. In the clinic of Prague, changes were invariably found in the fundus oculi in every case where an intracranial complication followed a disease of the middle ear.

Tenzer[2], in looking over the material in the ear clinic of the Royal Charite in Berlin, says that the literature on the subject is scanty. Tenzer[3] cites 100 cases of otitis media acuta or empyema of the mastoid which needed operating. Changes in the fundus were found in 23 cases of which 10 were uncomplicated Empyema. In

* Read at a Scientific Meeting of the Surgical Staff of Dr. Wendell C. Phillips' Clinic Manhattan Eye, Ear and Throat Hospital, New York, April, 1906.

looking over his own cases, of which he gives complete histories of 76, he found the fundus normal in 47 cases, and abnormal in 29 cases. They were divided as follows:

INTRACRANIAL CONDITION.		FUNDUS.		
Extradual abscess	normal	0	abnormal	5
Leptomeningitis	"	8	"	5
Sinus thrombosis	"	28	"	8
Cerebral abscess	"	9	"	9
Cerebella abscess	"	5	"	11

Of these cases, 47 proved fatal, and in 29 there was a favorable termination. Of the former or fatal cases there were 29 with normal fundus and in 18 the fundus was altered. Of those which recovered, there were 17 normal and 12 altered. In the fatal cases, there were 18 changes; 7 vessel changes and 11 neuritides or choked discs. In those which terminated favorably, there were 12 changes; 5 in vessels and 7 of optic neuritis or choked discs.

Koerner[4] seems to accept the presence of changes in the fundus in spite of the lack of intracranial diseases due to the extension of the diseased middle ear conditions to the optic nerve through the lymphatic vessels which run through the carotid canal.

Ucherman[6] of Christiania, says that in otitic brain abscess, an important sign is optic neuritis but as a rule it is a later development. In abscess of the brain, we may find diffuse and local effects manifested by choked discs and obstructive neuritis. There may be also paralysis of the motor and sensory nerves affecting the eye.

Von Grafe says, in choked discs from Chronic Meningitis, there may also be masses of exudate in the retina between the disk and muscuka resembling much the conditions found in Bright's disease. On acount of its involving quite a portion of the retina it may sometimes be called a neuro-retinitis.

Meningitis in various forms gives rise to a variety of ocular lesions. In basilar meningitis of the tractus by optic neuritis extension to orbits takes place generally along the veins producing chemosis and perhaps later orbital cellulitis, fixation and protrusion of the eyeball, etc., or by the production of a seroplastic or purulent choroiditis sometimes though rarely ending in panophthalmitis.

Quinke says, in meningitis, optic neuritis is not uncommon, but cannot be depended upon as a sympton of value.

Also in abscess of the brain, ocular symptoms are invariably present in the early stages, photophobia later, inequality of pupils with

dilation on the affected side, neuritis common in later stages. Very frequently lids do not close entirely and eyeballs roll upward.

McKernon says that, in Sigmoid sinus thrombosis, about 1-3 of the cases show ocular disturbances and that when puffiness of the eyelid on the side affected is present it sometimes is caused by an extension of the clot to the cavernous sinus and also by an interference with the return ophthalmic circulation.

Posey[6] says an infectious embolus or thrombosis leads to the formation of a cerebral abscess with the characteristic symptoms, while an infectious thrombosis of the cavernous sinus may, in addition to other symptms of an abscess at the base of the brain, result in orbital suppuration with its long train of disastrous effects. The eye ball is protruded and fixed by infiltration of the orbital tissues, the conjunctiva becomes chemotic, the lids swollen and there follows blindness with a widely dilated pupil. The ophthalmoscope shows distended retinal veins with the injection of the head of the nerves and retinal hemorrhages. Later as the infectious process extends, we have opacity and ulceration of cornea and finally panophthalmitis.

Wakefield[7] reports a girl of 11 years, who for the past 6 years had had occassionally slight purulent discharge from the left ear, who developed mastoiditis, and later temporo-sphenoidal abscess, in which there were slightly dilated pupils, the optic discs were hazy, and left internal strabismus was present.

Bacon[8] reports a case of a patient coming under his observation who had a chronic otitis in which an acute mastoiditis developed which was operated upon. Later a radical operation had to be done and a brain abscess also had to be evacuated. In this case there was double optic neuritis and hemorrhages in to the retina.

Pooly[9] reports a case of acute suppurative otitis and mastoiditis which was operated upon with subsequent sinus thrombosis and pyemia in which choked disc was found in each eye.

Oppenheimer[10] reports a case of chronic otorrhoea of 10 years' standing, in which mastoiditis developed and also cerebellar abscess. This case showed a beginning optic neuritis. He also saw a case in consultation in which there had been a suppurative otitis for 2 years following la grippe. The patient had been under treatment most of the time when mastoiditis developed and was operated upon. Eye grounds were normal. Later symptoms indicated cerebellar abscess. At this time the right eye was dilated, with photophobia, and the optic papilla was slightly swollen.

Oppenheimer[11] also noted Kirtland's case of a boy of 16 years having suppurative otitis for 3 years. Mastoiditis developed accompanied by left optic neuritis.

E. Gruening[12] reports a case seen at Mt. Sinai Hospital. The patient had had a discharge from both ears for 6 years. An abscess of the left temporo-sphenoidal lobe developed. Examination of eye grounds showed the papilla swollen, presenting the appearance of neuro-retinitis. The same author reports another case of cerebral abscess following an acute suppurating otitis of 5 day's standing in which the eye grounds were normal. Three weeks later when abscess developed, optic neuritis was found.

McKernon reports a case of a girl, N. G., age 11, who had chronic suppuration of several years standing, followed by an abscess of the brain in which there was double choked disc.

Jack[13] of Boston reports a case, J. W., age 25, of old suppurative otitis complicated with an abscess of the brain in which, upon the examination of the fundus of the right eye, there was observed a slight swelling of the disc and tortuosity of the veins. In the left eye there was marked swelling of the disc with a similar condition of the veins. There was paralysis of the left abducens muscle (the eye could not rotate out beyond the median line). The patient stated that the eye had always turned inward.

Arnold Knapp[14] reports J. A. age 24 male, a case of acute mastoiditis which later was complicated with an infective thrombosis of the sigmoid and lateral sinuses. On admission to the hospital 3 weeks after the first ear symptoms the eye grounds were normal. Ten days later there was a swelling of both discs which was transient as it had disappeared two days later.

He[15] reports a second case of mastoid fistula and external otitis complicated with thrombosis of the jugular bulb and severe pyemia in which there was optic neuritis.

Geo. A. Leland[16] reviews the mastoid cases operated upon in the Boston City Hospital from October 1903 to May 1904. There were 70 cases. *Case 16* was a chronic suppurative otitis of 39 years standing. There was slight choroidal atrophy with some congestion about the discs. *Case 6* was one of chronic suppurative otitis with recurrent mastoiditis and chronic superficial cerebellar abscess. On admision the eyes were normal in movements, etc. On the following day, there was slight rotary nystagmus increased by looking upward and outward, more marked to the right. Two days later, the pupils were dilated, right larger than left. This makes only two out 70 cases in which the eyes were involved.

Francis Huber reports the case of Ida B., aged 2½, who had suppuration from the right ear for more than 2 years. At the time of admission a serous meningitis had developed. There was convergent strabismus with moderate lateral nystagmus. The pupils were dilated, the right more than the left. Under light test the pupils contract slowly and to a moderate extent. Then slowly dilate again and again contract.

Thos. J. Harris[17] found, in the records of the Manhattan Eye and Ear Hospital, that during 10 years, 1895 to 1905, there were over 32,000 cases of middle ear diseases. 60 with intracranial diseases were found, divided as follows: Sinus Thrombosis, 23. Of this number 3 developed optic neuritis. Brain abscess, 7. Only one showed any ocular manifestations. The right pupil was dilated, which disappeared after an operation. Of the 30 cases of meningitis only one case was met in which there was optic atrophy.

Alice E. Wakefield[18] reports a case in which there had been a slight discharge from the left ear for 7 years, in which a latent Temporo-sphenoidal abscess developed. At the time she first saw her, there were no abnormal symptoms of the eyes apparent. Four days later the pupils were about ⅓ dilated equally; reaction to light sluggish; retinal veins, engorged and tortuous; color of discs grayish and outline hazy. At this time an abscess of the brain was opened. Three days later a second one was discovered and evacuated. At this time the pupil of the left eye was greatly dilated and did not react with strong light.

May[19] reports a case of cerebral abscess in which there had been a chronic discharge from left ear for 2 years. The fundus showed papilitis of marked severity, more especially in left eye.

Dr. Thos. Barr reports a case of a female, A. B., age 22. She had been suffering from recurrent attacks of suppurative otitis of the right ear in which a cerebral abscess developed. Eye findings were: both optic discs somewhat full with congestion of vessels, paralysis of extreme rectus of left and paralysis with slight ptosis which disappeared several days later.

Large reports a case of exophthalmos occurring the 12th day in an acute mastoiditis which disappeared the day after the operation was performed.

Barnhill[20] reports a case of Mrs. R. A., age 40, in which a large abscess occurred during the course of an acute attack of suppuration of the right ear; 3 days after operation the right pupil was very much enlarged, but no other symptoms were noted.

Guttman[21] reports a fatal case of chronic suppuration of 8 years standing complicated with cholesteatoma in drum cavity and antrum and cellulitis of almost the entire scalp, with thrombosis of the transverse sinus, cerebral abscess and softening of the cerebellum. There was choked disc in the right and optic neuritis in the left eye.

Jordan[22] reports a case of multiple otitic abscess in the temporal lobe in a patient, age 39, who had had a purulent discharge from the left ear since childhood. Upon entering the hospital the examination of the eyes was negative. A mastoid operation was undertaken and was followed by optic neuritis four days later. There was dilatation of right pupil.

Koller[23] reports a case of acute otitis media of 3 weeks standing in which the patient presented unmistakable signs of Thrombophlebitis with peribulbar abscess. Papilitis rapidly developed and this, Jansen claims, is a common occurrence in primary phlebitis of the bulb. The papilitis cleared up after several weeks.

Dench[24] reports the case of C. A., age 8, who came into the New York Eye and Ear Infirmary sufferng from acute inflammation of the right middle ear which was complicated with sinus thrombosis, mastoiditis and serous meningitis. After a few days illness, a beginning optic neuritis developed upon both sides, slightly more marked on the right side.

The same author[25] also reports a case of a young man who had a discharge for two years in which a radical operation was done. The eye grounds were negative for two weeks, then brain abscess having developed, there was a decided choking of left optic disc.

In conclusion, we find that we may have one or more of the following ocular manifestations of the external signs. We may have nystagmus, paralysis of the motor and sensory functions of the eyes and dilation of the pupils. Cellulitis occurs occasionally with protrusion of the eyeball, which may be fixed by infiltration of orbital tissues. Internally, we may have optic neuritis or choked disc of which I found 34 instances. Papilitis occurs occasionally, also neuro-retinitis and atrophy. The vessels are quite frequently changed in character. A seroplastic purulent choroiditis is noted though rarely ending in panopththalmitis.

In looking over such records as came to my hand, I found quite a number of cases of brain abscess of otitic origin in which there was no record of an examination of the eyes. Also the same is to be said of the recorded cases of meningitis which were the result of otitic diseases.

There were widely diverse reports as to the conditions found in meningitis, thrombosis and brain abscess. Some authors find very few in large numbers of cases, others find a large percentage in a comparatively small number of cases; and, until such a time as our cases receive more thorough examinations in all their aspects and careful histories of them are recorded, statistics will not tell the truth, the whole truth and nothing but the truth.

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THE RELATON OF SYSTEMIC DISEASES TO OTITIS MEDIA PURULENTA AND ITS COMPLICATIONS.*

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In dealing with acute or chronic suppuration within the tympanum, and more particularly with its various intracranial complications, we are frequently called upon to exclude general systemic conditions; indeed, frequently it is only by a process of exclusion that we are enabled to arrive at a diagnosis of intracranial disease. This applies particularly when we are dealing with children too young to define clearly their subjective sensations, and too restless to permit of a thorough and complete physical examination. It therefore behooves the otologist in arriving at a diagnosis, to be most thorough in his search for complicating systemic infections, and, on the other hand, a careful examination of the ears is essential in many cases where the real nature of the trouble is not at once apparent.

Among the more frequent conditions that require exclusion, are typhoid fever, malaria, cerebrospinal meningitis, pneumonia, tubercular meningitis, uremic and diabetic coma, and the early stages of some of the exanthemata. While for a few days it may be impossible to differentiate these diseases from some one of the complications of otitic suppuration, close observation and the careful application of all modern methods of diagnosis will usually clear things up; some of the more prominent symptoms of one will be missing, while special features of the other will become apparent. Too much stress cannot be laid on a careful study of the temperature chart and pulse rate, and on the employment of the differential blood count, and on the examination of the cerebro-spinal fluid in complicated cases of otitis media. They are very valuable aids which have recently become prominent factors in determining a correct diagnosis in this class of cases which offers so many difficulties to the diagnostician.

Typhoid fever, particularly that of the meningeal type, is sometimes extremely difficult to diagnose from a beginning meningitis occurring in the course of a chronic suppurative otitis media, or following operation for its cure. The history of a case which I have recently had an opportunity of watching, I think, will be of interest

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at this point. The patient, a young lady of 17, had a mastoid operation performed about the middle of October, 1905. The healing was imperfect, a sinus persisting in the region of the antrum, and discharge continuing from the middle ear. About the middle of January, 1906, she was seized with a violent headache, some feeling of chilliness, and vomiting. The temperature in eight hours rose from 99 to 105 degrees, and the pulse to 130. The pain all over the head was excruciating. On account of the persistent discharging sinus and the suddenness of the attack, meningitis was the most likely diagnosis, though the history would point more to a temperosphenoidal abscess, that had just reached the surface, causing a meningitis, or that had ruptured into a ventricle. The condition remained the same for 24 hours; the reflexes were normal, the eyes normal, and Kernig's and Babinski's signs were absent. It was thought advisable after consultation to operate again, exposing the dura and exploring the brain. This was done, but nothing was found to account for the severity of the symptoms. The blood count at this time showed a leucocyte count of only 4600, and a low percentage of poly-morphonuclear cells. This turned our attention to typhoid fever as a possibility. A Widal test at this time was negative, and there were no other signs of typhoid, no rash, no enlargement of the spleen, or any other of its usual symptoms. While the mental condition remained perfectly clear, the head pain somewhat subsided, an occurrence that is unlikely in meningitis, and at the same time the pulse rate and leucocyte count were against intracranial pus formation. The disease followed about the same course for the next three days, when undoubted symptoms of typhoid fever showed themselves. The typical rash, and splenic enlargement were present, and the diazo and Widal tests were positive. The patient went through an ordinary attack of typhoid fever, and made a good recovery. Had a blood count been made earlier, it would have thrown valuable light on the case, for I am inclined to think with a leucocyte count of only 4600, and a clear cerebro-spinal fluid showing no more than one or two leucocytes in 5cc., I should have postponed operation for a few days at least; while, without these tests, it was only the realization that the ear condition found on operation was not sufficient to account for the severity of the symptoms, that drew our attention to the typhoid fever, that as yet had not shown itself by a single typical sign except headache. I recall another interesting case in which, following a simple mastoid operation, a typhoid condition developed in a few days. The temperature was moderately elevated, only slight headache was complained

of, but the patient was apathetic and a slight abdominal rash was present, not typical however in any respect. Very little trouble had been found at the time of operation, and we were inclined to regard this as a case of typhoid. The patient died in a few days, and autopsy revealed a well marked and extensive basilar meningitis. These two cases show that it is not always easy at the onset to differentiate between typhoid fever in its various forms, and the severe intracranial complications of otitis media.

A condition almost as difficult to eliminate, and one that occurs more frequently, is pneumonia. This is particularly true in the pneumonias and broncho-pneumonias of children, where the physical signs are difficult to make out during the first few days and in which the exact time and mode of invasion cannot be accurately determined. A simple suppurative otitis in a young child will frequently send the temperature up several degrees and maintain it there, with a corresponding increase in the pulse rate, and some increase in the frequency of respiration. It will give all the symptoms of malaise and depression usually found in pneumonia; and a sight cough, under the circumstances, will quite likely direct one's attention to the lnugs, when the real difficulty may be located in the ears. The blood count does not offer us the same aid here as in the differentiation of typhoid fever, because in both conditions the leucocytes are increased and we have a large percentage of polymorphonuclear neutrophiles. If a free incision be made in the drum membrane and adequate drainage established, the symptoms accompanying an ordinary otitis media should subside within a few days, while those due to pneumonia would at that time in all probability be more marked, and the physical signs more apparent. A case presenting mastoid tenderness of slight degree may readily give a great deal of trouble in very young children. Otitis with slight mastoid tenderness is a frequent accompaniment of pneumonia, and to determine just how much stress should be laid on the mastoiditis, and when operative interference should be instituted is often a difficult matter to decide. The general practitioner and otologist should work together in all such cases; and, where practicable, the operation should be postponed until the lung condition permits of safe anaesthesia. The two conditions in most cases are no doubt due to the same infection produced by the pneumococcus.

In the post-operative observation of mastoid cases, we occasionally see a rapid elevation of temperature, headache, and possibly chill, increase in the rapidity of the pulse rate, and other symptoms pointing to a meningeal complication. In such cases, on account

of the recent administration of an anaesthetic we cannot be too diligent in our search for a beginning pneumonia, before coming to the conclusion that the brain coverings are involved. In young children, it is a frequent thing to find a broncho-pneumonia of a mild type, following an operation on the mastoid, which clears up in a few days, but at the beginning is quite alarming.

It scarcely seems possible that malaria should offer difficulties to the otologist. However not long ago I saw a case which had been under treatment for several weeks for malaria; but on operation, a clot was removed from the lateral sinus. There had been periodic chills and fever, accompanied by sweats. No careful record had been kept of the time of rise and fall in the temperature, and the patient had become so accustomed to his chronic discharge, that he failed to mention it to his physician. It was only on his admission to the hospital for the removal of a polyp from his ear, that the characteristic rise and fall in temperature was noted, and the diagnosis of sigmoid thrombosis made. The absorption from a clot may be so slow as to be very misleading; and, in cases of chronic otorrhea presenting symptoms as stated above, it is always advisable to look more closely for further indication of sinus thrombosis, for such may exist for a long time without mastoid tenderness or any signs other than those of septic absorption. Recently I saw a case of a young boy 9 years old who had no ear discharge, but complained of malaise, and loss of appetite, and on the second day slight oedema developed over the mastoid. I saw him on the evening of that day. His membrana tympani was normal, and no trouble existed in the middle ear, but in addition to his mastoid oedema he had a sceptic appearance that caused us to think an exploration of the mastoid was justifiable. We found practically no disease of the mastoid process until the sinus was uncovered, when a large perisinus abscess was discovered. Without the oedema, it would have been practically impossible to diagnose the true trouble in this case until the appearance of the typical temperature fluctuations; and even then, in the absence of middle ear involvement, our attention would hardly have been directed to this particular sinus. The presence of the plasmodium in the blood of course dispels all doubt in the case of malaria.

Cerebro-spinal meningitis or the exanthemata at their beginning, occurring in subjects suffering from otorrhea, may present symptoms similar to the intracranial complications of the latter. During the recent epidemic of cerebro-spinal meningitis, two cases which illustrate this point came under my care. One was sent into the

Manhattan Eye, Ear and Throat Hospital by the attending physician because an ear discharge from which he had suffered for several months had suddenly stopped, and the child developed a temperature of 101 degrees. He had headaches, especially at the occiput, had vomited considerably, and had becom very drowsy. His pulse was 115. On examination of the ear I found the canal dry, a large perforation in the drum, and no mastoid or jugular tenderness.. Athough I had come prepared to operate at once, I could find no justification for doing so, and suspected that the child was in the period of invasion of some of the eruptive fevers. In the course of a day or so, considerable cervical and spinal rigidity, as well as rigidity of the muscles of his limbs developed. The cerebrospinal fluid was under considerable pressure, and the diplococcus meningitidis was present in it. Large doses of antitoxin were injected at intervals of two or three days, each injection being followed by amelioration of all the symptoms. The child recovered in three or four weeks. The cessation of the aural discharge coincident with the beginning of the other symptoms was indeed misleading until the examination of the spinal fluid made the diagnosis positive.

Another case under observation at the same time showed in a particular manner the difficulties and doubts thrown on a case by the existence of an otorrhea, be it acute or chronic. I will take the liberty of briefly reporting it. The patient, a boy of 8 years, on admission to the Manhattan Eye, Ear and Throat Hospital, on Nov. 24, 1904, gave the following history: He had been a comparatively healthy child up to the present time. Three weeks ago he had a severe pain in the right ear which lasted a few hours, after which the ear began to discharge. This continued up to the time of admission, but was not at any time profuse in amount. Two days before admission, the child became quite ill, complained of pain in the head, particularly on the right side, and had considerable elevation of temperature. On admission to the hospital, his temperature was 100 degrees and his pulse rate 100. He had no cough, no pain except in the head, his tongue was heavily coated, and his face had a pained expression.

Examination of the ear showed a small perforation in the posterior quadrant, through which a small amount of pus exuded. There was very slight tenderness over the mastoid tip, and also a short distance below it, but not sufficient to indicate certain involvement of the mastoid process. Bacteriological examination of the ear discharge showed the presence of extra-cellular diplococci. A

free incision was made in the drum, and the ear carefully douched every two hours. At 8 p. m., on the day of admission, the temperature suddenly rose to 104½ degrees, his pulse was 122, and respirations 24.

On Nov. 25 the patient was examined by Dr. A. H. Smith, consultant to the hospital, and Dr. Terreberry, neurologist. They could find nothing, either in the child's general condition, or from the standpoint of the neurologist, to account for his high temperature, and the lassitude that he exhibited, except some condition arising from his ear. The thorax and abdomen were apparently normal, there was no muscular rigidity, the reflexes were normal, and a thorough examination of the eyes showed nothing. The blood count revealed a leucocytosis of 31,280, with 4,455,360 red cells. I regret that for some reason no differential count was made in this case. There was a slight trace of albumen in the urine.

On the same evening, the temperature rose to 105 degrees, the pulse was 120, and the respirations 44. The child became delirious, and nothing else to account for his symptoms being found, it was decided to investigate the mastoid. Accordingly, the same night, a very thorough Schwartze operation was done; but nothing abnormal was found. After the operation, the temperature had dropped to 101 degrees at 4 p. m. on the following day, but the general condition of the child showed very little improvement. Kernig's sign was now present and a considerable tendency to muscular rigidity, and some retraction of the head developed. The temperature remained between 104 and 105 degrees for the next two days with very slight variations. This maintained elevation of temperature almost certainly excluded the formation of a septic clot in the lateral sinus, or jugular bulb. The symptoms had now developed sufficiently to make a tentative diagnosis of cerebro-spinal meningitis. Bacteriological examination of the spinal fluid showed the presence of extracellular diplococci.

The condition gradually grew worse, the temperature remained about 105 degrees, the pulse 160, the pupils became dilated, lateral nystagmus developed, and the child died on Dec. 4th.

The following is the autopsy report. The dural sac was distended and thickened. On opening it, a turbid grayish cerebro-spinal fluid gushed out, apparently under considerable tension. The arachnoid is everywhere thickened, and covered with a thick exudate. The cranial dura was free from infiltration and the membranes of the convexity were simply slightly injected. The base of the brain, pons, and medulla were the seat of diffuse septic pachy-

meningitis, with plastic exudate covering also the base of the cerebellum.

An interesting point in this case was the finding of the same type of infection in the cerebro-spinal fluid, as existed in the ear discharge. Had this not been demonstrated, the case would probably have been classed as undoubtedly one of cerebro-spinal meningitis, on account of its occurrence during the recent visit of that disease to the city. Apparently there was no invasion of the meninges through the antrum or tympanic attic, and if the meningitis were secondary to the otorrhea, instead of a coincident infection, the route of infection was probably through the labyrinth.

Tubercular meningitis often complicates otitis of the same nature. Diagnosis in these cases is rather difficult, and any operative procedure is likely to hasten the fatal termination of the case. Following operation upon the mastoid in tubercular subjects, fluctuations in the temperature should always be regarded seriously, and the presence of a focus in other regions sought for.

The coma of uremia, and the nervous phenomena preceding the coma may readily simulate that occurring in cerebral or cerebellar abscess. A case suddenly becoming unconscious, and at the same time having a discharging ear, may present symptoms of both conditions, and require a great deal of care in properly diagnosing it. In chronic interstitial nephritis, the albumen may be very slight in amount, and the casts few, thus rendering our best method of diagnosis at least doubtful. The sleeplessness, vomiting, slight increase in temperature, muscular twitching, and other nervous manifestations, may be identical in both conditions. The state of the vascular system is of considerable importance. In chronic nephritis, we are likely to find some hypertrophy of the left ventricle, and general arterial fibrosis, whereas in cerebral abscess these are not so liable to be present. In nephritis, the arterial tension is usually high, and the pulse rate not slowed, while in the other case, the tension is not increased or the pulse rate diminished. Where meningeal oedema increases the intra-cranial pressure however, the pulse rate in nephritis may drop considerably. The eyes sometimes offer valuable assistance. If the fundus shows a retinitis at the macula, or the results of a previous retinitis in that region, the probabilities point toward uremia; but, if on the other hand the optic discs are choked, with well marked engorgement of the retinal veins intracranial involvement is more probable. Aphasia, while not a constant symptom of cerebral abscess of otitic origin, is a very valuable one when it is present. The patient can recognize objects and

designate their use, but is utterly unable to call them by name. I have seen three cases of tempero-sphenoidal abscess in the past two years that showed this type of aphasia.

In separating the various forms of coma, the differential blood count is very valuable. That due to meningitis and brain abscess is almost invariably accompanied by an increase in the total number of leucocytes, with a relatively high percentage of the polymorphonuclear variety. Uremic, post-epileptic, and diabetic coma sometimes shows a leucocytosis, but in the coma due to alcohol, hysteria, and narcotic poisoning it is very unusual. The cerebellar seizure described by Dana, and consisting of a sudden unexpected attack of extreme vertigo, roaring in the ears, relaxation of the limbs, and a sudden falling to the ground in a state of semi-consciousness is a valuable syndrome. Tonic spasm sometimes takes the place of the muscular relaxation.

Intracranial suppuration is often so insidious, and gives so few indications of its presence, that an abscess will remain quiescent for several months, without causing any trouble beyond possibly a headache. I have seen this so often, that where a chronic aural discharge is present, I am always suspicious of a continuous headache, especially if there be loss of memory, or mental fatigue be easily induced. A case occurring recently in the practice of Dr. Wendell C. Phillips illustrates this point. The patient was a young man of 18, apparently healthy in every respect, except for a persistent headache during the past six months, and chronic otorrhea. A radical operation was done for the purpose of curing the aural discharge. Within 48 hours after operation his temperature rose to 103 degrees, and he complained of severe fronto-parietal headache. A large tempero-sphenoidal abscess was opened, and about one ounce of pus evacuated, certainly more than would represent the disintegration of several days. Optic neuritis was developed in both eyes by this time. Beyond a doubt the pus collection had been going on for a long time, possibly several months. I recall another case in which an abscess existed in the frontal lobe for about fifteen months, during which time the patient gained weight, and worked as a freight handler without inconvenience. At the beginning of his trouble he complained of headache a great deal, and presented some symptoms of frontal sinusitis. Examination of the eyes showed optic neuritis in both. He had aphasia, and other mental symptoms, and the diagnosis of frontal abscess was made. He completely recovered both his mental vigor and his vision, had no headache, and expressed himself as feeling fine in every respect.

Fifteen months afterward he suddenly became unconscious, and died in a few hours. A large frontal abscess was found at autopsy.

Cases of this kind, though fortunately not of common occurrence, show us that we cannot regard with too much seriousness those that have necrosis in the tympanum and exhibit at the same time the symptoms above enumerated. Such patients should always be questioned regarding previous attacks of otorrhea, because sometimes long after the discharge has ceased, a latent focus of infection may be found in the tempero-sphenoidal lobe or cerebellum.

One of the more frequent complications of otitis, and one that can sometimes only be recognized by the absence of other sources of infection to account for symptoms of septic absorption, is primary jugular bulb thrombosis. This is produced by invasion of the bulb through the floor of the tympanic cavity, which is exceedingly thin, and is the only barrier existing between the vein, and the pus in the middle ear. Not only is this plate always thin, but it is occasionally absent entirely, in fact it is stated that in children under the age of 12 years this is not at all rare. That this is the usual route of infection is denied by some, who claim that the small venules in the mastoid bone are the channels through which micro-organisms reach the sinus. Whichever view is correct, and I am inclined to think that both theories have merit, we know that primary thrombosis does occur, that is there is no accompanying involvement of the mastoid cells, at least none that can be determined at the time of operation, although it seems probable that pathological changes may exist in the bone that cannot be demonstrated macroscopically and yet be of sufficient severity to cause changes in the blood and produce a clot. Slow absorption from a clot of this kind may produce metastatic abscesses in the lungs, or even endocarditis, the discovery of which would draw our attention from the primary lesion in the jugular bulb, especially in the absence of mastoid tenderness, or pain in that region. The discovery of bacteria in the blood stream is of great assistance to us in arriving at a correct diagnosis in such cases. Dr. Gruening, in discussing this subject at the academy of medicine recently, reported two cases in which on this point alone, a septic thrombosis had been diagnosed, and found at the time of operation. With the presence of micro-organisms in the blood, accompanying a chronic suppuration in the ear, if they cannot be accounted for in any other way, it is fair, in the light of recent work along this line, to suspect the presence of a clot in the jugular bulb, or sigmoid sinus. Dr. Frederick E. Sondern, in a paper published in the Boston Medical and Surgical Journal, Dec.

21, says: "Blood cultures as diagnostic and prognostic aids have also increased very much in value. Present knowledge seems to indicate that the former negative results can be ascribed to undue concentration, and consequent bactericidal action of the shed blood. With proper technic, and sufficient dilution in fluid media, the method is most useful, particularly in septic conditions. Its practical use demands expert technic and full bacteriological laboratory equipment."

Up to the present, we have been discussing more particularly the differential diagnosis of conditions of otitic origin from those due to other causes; but a paper on the relation of systemic diseases to otitis media and its complications, even as brief as this, would be very incomplete without at least a reference to the part general diseases play as causal factors of otitis media, and to the influence they exert upon it.

Nearly all cases of middle ear disease have their origin in some of the infectious fevers, particularly the exanthemata and influenza. Measles and scarlet fever, especially in this region where adenoids are so prevalent, are responsible for a large number; but it also occurs not rarely in typhoid fever, pneumonia, diphtheria, and grip, and in the treatment of these diseases the nose and throat should be kept as clean as possible. As a prophylactic measure the removal of adenoid vegetations from the naso-pharynx, whenever they are discovered is most advisable, because during the course of any febrile attack they are a serious menace to the ears.

In the treatment of otitis, too much attention cannot be paid to the general health of the individual; for our efforts will almost surely be fruitless, if in the zeal expended on local treatment, we neglect to improve as much as possible the metabolism, and hygienic regimen of our patient.

The principal conclusions to be drawn from these few remarks are: First, that the presence of acute or chronic otitis media adds difficulties in the diagnosis of many systemic diseases, and on the other hand the possibility of a co-existing general invasion should not be neglected in the treatment of the ear. Secondly, that in every case where any doubt exists our various bacteriological and pathological aids should be employed, and that more frequent consultation between the otologist, and the general practitioner would no doubt result in more accurate diagnoses.

40 West 47th St.

DISCUSSION.

Dr. Hubby reported in this connection a case which had come under his observation in the clinic at the Manhattan Eye and Ear Hospital. The symptoms, which pointed to the ear, failed to respond to treatment directed to that organ. Upon examination of the blood tension with the sphygmomanometer he found it very high, and immediately put the patient on 1/100 grain doses of glonoin. The symptoms disappeared within a few days.

Dr. Fowler said the pneumonia which sometimes followed anesthesia in mastoid operations seemed to be a peculiar type of bronchopneumonia. He had observed such a case in the clinic at the Manhattan Eye and Ear Hospital last fall. Dr. Smith, who was called in consultation, said the consolidation in these cases seemed to shift from one part of the lung to another.

Dr. Denchfield said the paper emphasized the importance of the otologist's being experienced in the general practice of medicine.

Dr. Held mentioned a case following a simple mastoid operation in which the child did well for thirty-six hours, when there was a chill, a sudden rise in temperature and subsequently a fall in temperature. The lungs were examined, the bowels and stomach enquired into, the blood examined for malaria, but nothing was found. There was a second chill and the second day the temperature rose to 106°. The sinus was opened, nothing found. After that the patient made an uneventful recovery. He supposed the condition due to simple absorption, or else to phlebitis without the formation of thrombus.

He had known two cases of tubercular meningitis following the radical mastoid operation. On the other hand, he had known three cases of mastoiditis operated on that were tubercular. Two showed undisputed signs. One showed a tubercular apex, and, in another, a sequestrum from the ear had been reported from the laboratory. One had multiple abscess. All made good recovery. Recovery in the case of multiple abscess was due to strict attention to diet and general treatment.

Dr. Kopetzky said he was disappointed that Dr. Thomson had not taken up the subject of diabetes in relation to middle ear disease. It was an important question whether or not to operate in these cases. In some cases there might be local gangrenous spots which would heal, while in others healing might not take place.

DR. THOMSON, closing, cited a case of diabetes which had come under his observation while he was House Surgeon in which operation revealed the most extensive destruction of the mastoid he had ever seen. The bone was absolutely necrotic, black in color and had a very offensive odor. The woman recovered nicely from the anesthetic but died in coma the next morning. He had since been afraid to operate on diabetic patients. He recalled a case, one of Dr. Spicer's, with fatal termination from uremic coma. In this instance, very peculiar symptoms developed the next day after operation which were very puzzling until it was learned that the patient had Bright's disease.

DR. THOMSON said the case reported by Dr. Held suggested one in which Dr. Phillips had done an adenoid operation which was followed by a temperature of 106°, pulse 155 and respiration 45. It cleared up in a day or two. The cause was unknown, unless it was from loss of blood, which had been great.

DR. PHILLIPS said it must be remembered that as a rule there is fever after mastoid operation. Dench, in his paper on temperature after mastoid operation, showed that temperature was the rule rather than the exception.

DR. HELD said that many cases, according to Dench, showed temperature and many times rapid pulse, but in the many cases reported by him distinct chill was not noticed. In the case just mentioned, the patient had a chill two days in succession, with very high temperature and corespondingly fast pulse.

DR. KOPETZKY said it is accepted that the temperature goes up until after the discharge has been established or until the third day; but it is not considered a septic temperature.

THE TREATMENT OF ACUTE SUPPURATIVE OTITIS MEDIA.*

BY EDMUND P. FOWLER, M.D., NEW YORK.

It is well now and then to carefully review our experience in the treatment of disease, to the end that we may discern whether we have adhered to well-established procedures, or have allowed ourselves to be diverted therefrom by the fads and fancies so persistently presented for our acceptance. Particularly edifying is it for those of us who deem ourselves specialists in the various branches of Medicine and Surgery, to undergo this mental retrospect. With this object in view, I have gone over the treatment of acute purulent otitis media, and herein briefly set down my conclusions. I shall consider at this time no complications of disease and will refrain from going into elaborate details of treatment, which after all must depend in any case more or less on the specific conditions presenting, and the individuality of those in charge.

In the early stages of all acute inflammation of the middle ear, it is impossible to foretell whether the purulent condition is to eventuate, and it therefore becomes necessary to regard all cases in the light of a possible purulent inflammation, and to institute measures which will tend to abort or shorten, cure or guard against recurrence of such. Knowledge of the aetiology plays a principal role in the treatment of acute otitis, for manifestly the recognition and removal of the cause of the diseased condition, induces a return towards normal of the affected tissues.

In the first rank of causative factors, stand the acute and chronic rheno-pharyngeal inflammations and tumefactions. In children, owing probably to the short and open-mouthed Eustachian tube, and to their proneness to the above affections, more than three-fourths of all cases are caused by the presence of pathological conditions in the upper air tract. In the second rank stand the infectious diseases, particularly the exanthemata, and of these notably scarlatina, one-fifth of which are accompanied by some ear involvement. Fluid introduced into the tympanic cavity by way of the Eustachian tube may carry pathogenic bacteria, and trauma, even Politzeration, may, by rupturing the drum, permit of infection of the tissues beyond. Vegetable moulds in the external auditory

* Read at a Scientific Meeting of the Surgical Staff of Dr. Wendell C. Phillips' Clinic, Manhattan Eye, Ear and Throat Hospital, New York, April, 1906.

canal by continuity may involve the tympanum, and rarely purulent processes in another part of the body may set up secondary infections in the middle ear. Many of the above causes of otitis media are removable before they have occasioned tympanic involvement, and many may be modified before such involvement goes beyond the early stages, after which it is impossible to abort the disease. So much briefly as to aetiology, and the obvious preventive treatment indicated, not forgetting that many drugs, and many constitutional diseases, and conditions, greatly influence the suspectibility to disease, and that often a definite cause cannot be assigned. Therefore in every case of acute otitis, we would if possible carry out the following: Promptly institute measures which tend to diminish congestion. Put the patient to bed, and on a fluid diet, with no stimulants or hot beverages. Elevate the head and shoulders on a pillow or pillows, and have the surroundings as hygienic as is possible. Caution the patient in blowing the nose to blow but one side at a time, thus minimizing pressure and congestion in the pharyngeal vault, and so tending to prevent fluid and infection from entering the Eustachian tube. Depending on age and condition, give calomel, gr. ⅛ to grs. III several times a day, and as soon as this has thoroughly moved the bowels, administer a saline, or on account of its soothing effect on the mucous membrane of the upper air tract, Oleum Ricini, may be substituted, and in repeated small doses. Be sure to examine the nose and naso-pharynx, and unless there are valid reasons for delay, endeavor to remove at once the pathological conditions there existing. It would seem theoretical to try and increase leukocytosis, either locally or generally, but it may be, we can accomplish something in this line in the near future, if not at this time, for from many sources light on the subject is beginning to eminate.

If seen before spontaneous rupture has occurred, this misfortune must be anticipated, for, though in rare instances such perforations may successfully drain the abscess cavity, and all symptoms subside within a few weeks, the drum returning to nearly a normal condition, and little functional trouble being apparent, the result is apt to be quite different. It is in these neglected cases that we get intra-cranial complication, great destruction of the drum membrane, a tendency to chronicity and necrotic processes in the surrounding bony structures. Because we have instituted treatment during the first day or so, because of lack of virulence in the infecting bacteria, or (and more probably) because of a strenuous and successful fight by the antibactericidal agents in our patient's body fluids, we see

cases which we say we have aborted. This outcome can only be hoped for very early in the disease.

The measures employed besides those already mentioned are: Hot compresses or hot irrigations and installations (10% Phenol in glycerin and such like) and with Adrenalin installations into the external auditory canal. Local depletion in front of tragus. Very gentle Politzeration, which latter procedure at times seems to diminish the pain, and secure drainage in quite an unexpected manner. It is applicable to only a limited number of cases and those seem very early. If all of these drops in the bucket, out of the bucket, and in and out of the ear, do not speedily relieve the symptoms, incise freely and thoroughly the membrana tympani.

The following may be laid down as indications for incision of the drum membrane in acute otitis:

1. No improvement in symptoms in two or at most three days. 2. Violent pain and insomnia for even one night, with temperature of 100° F (38° C) or over. 3. Marked bulging of drum membrane, with swelling and tenderness over mastoid process. 4. Symptoms of meningeal infection, or irritation. 5. In the acute exanthemata even if no alarming symptoms are present. 6. Tumefaction in the posterior superior wall of external auditory canal, near the drum. 7. In children, as soon as the drum is distinctly distended. It is of the utmost importance to note the appearance of the membrana flaccida, as almost invariably the first signs of inflammation appear in this locality, owing to the density, amount, reduplications, recesses, and easily affected blood supply of the connective tissues hereabouts. Therefore note if there is venous congestion, diminished lusture, aedema, tumefaction, or moisture in this locality.

Incisions of the drum membrane should be carried out on strictly surgical principles, remembering, however, that in the ear we have the most tiny and delicate mechanical and nervous mechanisms, and every manipulation though it be ever so gentle, is to this wonderful piece of machinery a violent trauma, and consequently injurious and inhibitory to recovery. After thoroughly cleansing the auditory canal with peroxide, alcohol, bichloride, or by any other rational method and drying with sterile cotton-tipped ear applicators, we are ready to incise the drum membrane. This is best done at the point of greatest bulging, usually in the postero-superior quadrant. Divide the deeper tissues in the vault as it is here where lurk the virulent organisms whose presence and whose life processes are

irritating and poisoning their human host. Carry the incision from the vault out on the postero-superior wall of the canal down to the bone. This should seem sufficient to secure drainage and bleeding, which latter may be prolonged by irrigations with warm sterile water or normal salt solution. If adequate, these procedures will occasion the immediate relief of pain and symptoms due to pressure. If seen later, the incision should be started lower down, and it may be that two or three or more incisions will be indicated, on account of the extensiveness, virulence, or multiplicity of the inflammation. After spontaneous perforation, or after incision, make a smear of the evacuated fluid, being careful not to contaminate with extraneous pus from the auditory canal, and not to carry a complicating infection into the tmypanic cavity, as it is these mixed infections which tend toward a chronic suppuration. Examine to determine the specific organism or organisms accountable for the suppuration. This is important, not only from a diagnostic standpoint, but it will enable us more intelligently to meet the pathological processes presenting later.

It now behooves us to maintain the drainage established, and many expedients have been introduced to accomplish this sometimes easy but ofttimes difficult task, and then discarded. I have been in the habit until recently of using for this purpose and for the removal of the discharge hot bichloride (1 to 5000) irrigation, repeated every three hours, with a two-quart fountain syringe, through one of Lucae's glass ear douches. These irrigations cannot be given by the ordinary mother, nurse, or physician, unless they have had experience in this line, without the help of Lucae's douche, I insist upon all patients obtaining this little instrument, which makes easy, painless and efficient that which without its use would be quite the opposite.

With the patient lying on the affected side, for the first few days following the operation gravity will be brought into play as an aid to drainage. I see the patient daily, clean the canal with cotton on applicators, and apply an ear dressing if the discharge is profuse, changing it as often as is necessary. Later, as the discharge diminishes and becomes more watery, if there is no bad odor, I irrigate less frequently. If all goes well, in two or three weeks, sometimes more, sometimes less, all symptoms cease and the drum and hearing return to normal, or very nearly so.

Much has been written regarding the use of Baer's Hyperemia in acute suppurative cases, but the data as yet is not sufficient nor con-

clusive as to the advisability of its employment in acute otitis. If used too early, it might work great harm, and if used later it may be that the ear gets well in spite of rather than because of the increased congestion. The subject is yet sub judice.

As soon as the drum has healed, if pain has disappeared, I Politzerize at first daily, and then at longer and longer intervals until the hearing ceases to improve under such treatment. I attend at the same time to the abnormal conditions in nose and nasopharynx, and find that massage of the neck may be agreeable and beneficial.

Some cases seem to do badly under irrigations, that is, the discharge instead of diminishing remains profuse or increases in amount. If this occurs, stop the irrigations and have recourse to astringents and antiseptics, being careful not to in any way occlude the lumen of the perforation. These measures are also indicated if the walls of the canal become boggy from continuous washings, or if slight moisture persists long after the discharge has gotten to this stage in its disappearance.

Great care must be observed for two or three months not to expose the affected canal to cold; and it is wise, after the discharge has ceased, to keep a little cotton loosely placed in the mistus for protection. If granulations or bulgings or thickenings occur on the drum membrane they should be removed if possible with a cutting forcep or with silver nitrate solutions (1 to 50%).

In obstinate cases some deem it advisable to irrigate through the Eustachian catheter or to Politzerize during irrigation of the canal. Astringents introduced into the canal or ino the tympanic cavity are sometimes of service in these conditions. Pilocarpine has been used hypodermically.

It has no doubt been marked that I have paid but little attention to symptoms in the treatment of acute otitis media, although it is symptoms from which the patient urgently demands relief. I have left this subject until last for the reason that the best treatment is the early and adequate incision of the drum membrane, which allows free drainage and the removal of the cause. If the drainage is adequate, all signs of confined pus promptly disappear, and so it is unwise to deprive ourselves of the means of noting this occurence, unless for reasons it is imperative so to do. In many cases there is no pain complained of, and in children only about one-third of the cases give signs of it. The coal-tar products in the adult, have little effect on pain due to otitis media, and I therefore give

morphine if it becomes necessary to obtain quiet and sleep for a day, or maybe two; but I do not repeat it if the mastoid becomes tender and does not clear up with the treatment instituted. In this connection, it is well to note that the mastoid may and often does become involved before the spontaneous perforation. When this occurs, all symptoms are apt to get markedly worse.

Fever is present in almost every case of acute otitis, and I believe always in children, the younger of whom are especially liable to high temperature, 104° or more, with convulsions, delirium, and irregular pulse. I believe in the use of aconite to control these manifestations, and administer it in frequent doses until the desired effect is apparent.

Headache, insomnia, vertigo, tinnitus, depression, etc.. should disappear under the treatment that has been outlined; otherwise we have reason to fear serious extensions and complications. The best results obtained depend on adequate drainage, and this, on account of the histological and anatomical construction of the middle ear, it is often impossible to secure. I have devised a method for maintaining drainage by means of a wick of gauze which promises well in all uncomplicated cases, and in some of the latter. On account of limited application of the idea, I desist from going into details at this time.

391 West End Ave.

DISCUSSION.

DR. HUBBY emphasized the testimony of Dr. Fowler in regard to the douche treatment, saying he had often had patients return, after careful instructions, looking as if the ear had never been washed. He did not know whether Lucae's douche is successful or not. Packing with gauze he mentioned in his paper simply to condemn it. He had seen it employed in a few cases and the drainage was not sufficient. Even if removed in one day, if the inflammation is excessive, the pus will be dammed back and, as in the cases he had seen, mastoid symptoms result.

DR. KOPETZKY asked on what authority Dr. Fowler recommended the elevation of the patient's head and shoulders.

Since adrenalin has no effect on the skin he doubted if any result would be obtained from its use without incision..

The Beir treatment could be used not too early but too late. It cannot be used before the disease is present because the patient will not come for treatment, and when the disease is present it cannot

be used too early. He did not advocate masking the symptoms by the use of morphine, preferring to have the patient spend a sleepless night, and be able to give his symptoms, rather than have sound slumber and say he feels well next morning, only to have mastoid involvement the second day.

He had seen the dry treatment used for two years with excellent results. The patient was seen once or twice a day and the method proved very satisfactory.

Dr. Denchfield wished to emphasize from his own experience at the Manhattan Eye and Ear Hospital what Dr. Fowler said with reference to the douche and paracentesis. He always instructed patients to use a fountain syringe with at least two quarts of hot water. Some patients complain of dizziness, which can be prevented by the use of the little glass recurrent flow nozzle.

He did not agree with Dr. Kopetsky concerning the question of pain and the use of morphin. Few men, he believed, use less morphin than he does, yet he would certainly advocate its use in the presence of such intense pain.

Dr. Held took exception to Dr. Fowler's statements concerning the frequency of otitis media in scarlatina. Scarlatina patients have otitis media in 18 per cent. of cases; in malignant cases 50 per cent.

With reference to the abortion of otitis media purulenta Dr. Held cited a case in which Shrapnell's membrane dropped down in a bag. The patient refused to have a paracentesis, but with douches of hot water and the use of adrenalin the case was aborted. He always used that method in abortive cases. He believed the time to do a paracentesis was when the short process and handle of the malleus are no longer visible.

Dr. Dougherty said it is a surgical axiom that where there is pus it must be let out. The surgeon never hesitates for a moment as to whether he shall paint with iodine or use various other methods, but immediately lets the pus out. So, in the ear, if pus is present, drainage must be established. If drainage can be gotten through the Eustachian tube, very well; otherwise an opening must be made. Douching means nothing more nor less than trying to assist drainage. If the stream of water, bichlorid, boracic acid, or whatever is used, could be gotten into the tympanic cavity and the cavity washed out the treatment would be perfect. He did not believe in dry packing, but he most thoroughly believed in the wick treatment, in placing a small piece of gauze in the canal and if possible through the perforation to act as an absorbent and a drainage course for

the pus to run along. He did not believe in the alcohol and iodoform treatment in acute cases any more than in douching. When alcohol and iodoform are used in acute cases it merely amounts to treating the membrane. In chronic cases it is most excellent.

He had been surprised to find so few cases of scarlatina complicated with purulent otitis media. The few cases which he had found had been those in which the septic poisoning was intense, or where the condition was complicated by diphtheria or intense inflammation from the rhinopharynx or pharynx.

If cotton is used in the canal, as suggested by Dr. Fowler, the original disease will be complicated by eczema.

The question of morphin has two sides, the scientific and humanitarian. Dr. Kopetzky spoke from the scientific point of view, Dr. Denchfield from the humanitarian. It is difficult to decide between the two. The symptoms are masked in all cases where it is given, but if a competent attendant is in charge he would advocate its use in case of intense pain.

DR. HELD said he had not mentioned the alcohol and iodoform treatment to advocate it, but simply as one of the methods being employed, particularly in England.

His statement concerning the statistics of ear complications in scarlatina were based on Dr. McEwen's examination of 12,000 cases, which showed 12 to 18 per cent.

DR. PHILLIPS said he did not suppose any one thought the irrigating douche, as ordinarly used, ever entered the tympanic cavity, especially where a paracentesis has been made. It will enter, however, when nature has made a round hole.

DR. KOPETZKY said that even when nature makes a perforation and methylene blue is injected it will be found that the fluid does not enter the cavity.

DR. PHILLIPS said the douche is used for two purposes, first, for cleansing the external auditory canal, and for removing the pus, thus allowing further free drainage through the perforation made in the drum membrane. The healing process is the same as would follow the opening of an abscess cavity in any other part of the body. If the delicate lining membrane of the tympanic cavity would allow packing, it would probably be well to do so, but it is impossible from the nature of the membrane, particularly as it rests against a bony wall.

Intratympanic irrigation through the external auditory canal should be done very carefully; in fact it should be attempted only by an expert, as much harm may be done thereby.

Incision through the drum membrane then outward into the canal for purposes of local blood letting seldom leads to bad results in spite of the fact that the knife first passes through a pus cavity.

Politzerization should never be resorted to in acute cases until the nose and nasopharynx have been thoroughly cleansed.

The question of giving morphin depends upon whether or not the case is a purulent one. If the drum membrane is bulging an incision should be made, but in uncertain cases, where it is desired to avoid paracentesis, it is a question whether twelve, eighteen or tweny-four hours of pain or the morphin would do the patient the more harm. He was inclined to believe the pain would.

DR. FOWLER, in closing the discussion, said that the insertion of gauze was used for drainage, to promote capillary attraction, and to suck out, if possible, from the tympanic cavity the fluids therein.

The head and shoulders are elevated in a case of otitis media for the same reason that the feet are elevated in edema, to lessen congestion. If the head were dependent hyperemia would follow. The head may be elevated and the patient lie on the affected ear, and so promote drainage. Pain in the ear is increased by putting the head down.

Adrenalin was mentioned as one of the measures employed. He had never used it.

He did not go into elaborate details regarding paracentesis, merely saying it should be performed under strictly surgical precautions, which means, necessarily, thorough cleansing of the canal, so that the knife can be carried in without contamination.

He considered the Bier treatment, though founded on plausible theories, contrary to the teaching of centuries. The treatment has been to diminish hyperemia and not to increase it.

He agreed with Dr. Phillips that morphin should be used in cases of acute pain, as the patient must have rest. He considered it a mistaken idea to think morphin was useful only in relieving pain. Many a case on the border line between suppuration and non-suppuration is dependent upon the patient's resisting power, and this can be increased by quiet and rest of the body, particularly of the circulation. Morphin is not used enough in a curative way.

Lucae's douche is not used, as all know, to cleanse material from behind the drum membrane. It cannot do this, but it does in some way increase the drainage from behind the membrane. It works similarly to a Sprengel's air pump, and sucks the fluids from behind the drum. For this reason he believed Lucae's douche to be much more efficient than the ordinary douche.

He believed many cases, even with bulging Shrapnell's membrane, abort themselves. The bulging may be due not to pus, but to serum, and if left alone will get well.

He did not agree with Dr. Held concerning the use of hydrogen peroxid in acute cases. It does get behind the drum, increases the pressure, and hence also the pain.

With reference to Dr. Dougherty's statement that pus should always be let out, he said the trouble is that this cannot always be done. In this regard, the condition under discussion differs from other surgical conditions. If some of the pus can be let out nature can probably take care of the rest.

He did not believe in the use of cotton when there is any discharge from the ear, only when the discharge has entirely ceased.

While the tympanic cavity can be successfully irrigated through the Eustachian tube, he doubted if it is a good procedure. It is traumatic to the Eustachian tube, interferes with ciliary action, and with drainage.

THE CLINICAL VALUE OF THE BLOOD EXAMINATION IN OTITIS MEDIA PURULENTA AND ITS COMPLICATIONS.*

BY LESTER M. HUBBY, M.D., NEW YORK.

The condition of the blood is an accurate and delicate barometer of the entrance of pathogenic bacteria and their products. In general the greater the effect on the blood the more radical must be the alleviating procedures. A simple ulcerating surface with no pockets or crannies, other things being equal, will produce less changes in the blood than an equal surface whose discharge is more or less prevented from escaping. A bacterial action on a freshly cut or denuded surface changes the blood more rapidly and more completely than when exerted on tissues whose exposed parts have been walled off by barriers of round celled infiltration.

The kinds, combinations and virulence of the bacteria influence the blood picture: Opinions at present vary as to the pathogenic srength of the different ordinary pus-producing bacteria and combinations of bacteria. The streptococci and streptococcic combinations are the most powerful. Combinations of two or more other pus producing bacteria come next. Pure cultures of the staphylococci and diplococci intracellularis seem to be the weakest. This order, of course, considers the average virulence of the bacteria and the average tolerance of the patients.

The blood picture in purulent diseases of the ear and adnexa is at present made up of the following views:

1. *Haemoglobin:* This is markedly reduced in amount in septicaemia and pyaemia.

2. *Haemocytes:* There is a decrease in numbers in septicaemia and pyaemia, but not so rapid.

3. *Leucocytes:*

a. Leucocyte count: This varies normally from 3000 - 10500 per cubic millimeter depending upon the nourishment of the patient. Impoverishment of health and leucopenia are coincident. A conception of the normal count of the individual is necessary before the diagnosis of a moderate leucocytosis is possible. In general a count of over 8000 should be viewed with suspicion. On the entrance of septic matter into the blood the leococytes also rapidly gather there,

* Read at a Scientific Meeting of the Surgical Staff of Dr. Wendell C. Phillips' Clinic, Manhattan Eye, Ear and Throat Hospital New York, April, 1906.

providing the toxaemia is not overwhelming. The amount of the leucocytosis is therefore a measure of the body resistance to the infection. An increasing leucocytosis means a spreading process and may be the only evidence of the fact. (Cabot.) In inflammation, leucocytosis is present as long as the exudation process persists.

b. Differential leucocyte count: Ehrlich's figures for the proportions of the various forms of leucocytes in a healthy adult are as follows:

Lymphocytes	22-25%
Large mononuclear	2-4%
Polynuclear neutrophiles	70-72%
Eosinophiles	2-4%
Mast cells	5-2%

In childhood:

Lymphocytes	55-66%
Polynuclear neutrophiles	28-40%

According to Sondern, the polymorphonuclear leucocytes relatively increase according to the severity of the toxic infection. A relative percentage below 70 with a marked leucocytosis excludes the presence of gangrene or pus, while 85% of polymorphonuclears always means pus or gangrene. Several cases are however on record in which the percentage was above 85% and on operating no pus or gangrene were found (Jessup). The average percentage in six mastoids coming to operation at the Manhattan Eye, Ear and Throat Hospital where the percentage count was made did not reach above 80.08%. The lowest was 64% in an acute case.

Sondern sums up, as follows:

1. Slightly increased polynuclear percentage indicates slight infection, irrespective of the leucocyte count. 2. Greatly increased polynuclear percentage indicates severe toxic infection, irrespective of the leucocyte count. 3. Slight leucocytosis with slight polynuclear increase indicates fair resistance and a slight toxic infection. 4. Pronounced leucocytosis with slight polynuclear increase indicates good resistance and a slight toxic infection. 5. Slight leucocytosis with pronounced polynuclear increase indicates poor resistance and a severe toxic infection. 6. Pronounced leucocytosis with pronounced polynuclear increase indicates good resistance and a severe toxic infection. 7. Absence of leucocytosis with pronounced polynuclear increase indicates no resistance and severe toxic infection; and a falling leucocytosis with a rising polynuclear percentage

indicates diminishing resistance and increasing toxic infection. 8. Falling leucocytosis with a falling polynuclear percentage indicates diminishing toxic infection.

Large mononuclear lymphocytes are increased in malaria. This assists the diagnosis when the plasmodium is not found.

4. *Bacteria and protozoa*.

a. The microscope will reveal the protozoa plasmodium malariae, the filaria sanguinis hominis, the schistosoma haemattobium (blood flukes), and the typanosome; also the spirochaete of Obermeier (relapsing fever) and other bacteria if in sufficient numbers.

b. Blood cultures of bacteria are becoming more valuable as the technique improves. In obscure septic cases they may clear the diagnosis.

c. The Widal reaction merely needs mention. Its use and value are apparent.

5. Cryoscopy and iodophilia in suppurative ear diseases is not of much importance. Yet a marked iodine reaction without leucocytosis is often present in virulent cases; and no septic condition of any severity can be present without a positive reaction. (Cabot.) Therefore iodophilia with a low leucocyte count and bad clinical symptoms will often complete the understanding of the patient's condition.

The application of the above principles to otitis media purulenta and its complications is simple. I will make therefore only a few remarks about the leucocyte examination in suppurative diseases of the ear and adnexa.

Otitis Media Purulenta Acuta. In serous cases the leucocytosis rarely reaches 12,000 and the polynuclear percentage above 75%. In the purulent forms the average count is 14,000 and sometimes reaches 36,000. The polynuclear percentage will vary according to the virulence of the infection.

Otitis Media Purulenta Chronica. Low leucocytosis when serious in type; higher as long as active exudation persists and when there is not a free vent for the pus.

Mastoiditis and Bezold's Mastoiditis. Marked leucocytosis, increasing if the process is spreading and the body resistance is good. A high polynuclear percentage with slight leucocytosis and severe clinical symptoms indicates immediate operation. A positive iodine reaction with low leucocytosis also points to a virulent infection and a poor body reaction.

Thrombosis of Laternal Sinus. A positive culture test would demand immediate ablation of the internal jugular, and curettage of the sinus. Unfortunately the test is long and difficult and therefore is not used as often as its value warrants. A microscopical demonstration of pus bacteria in the blood is also difficult. There is always marked leucocytosis in this condition as long as the process is active. A thrombosis engrafted on an old, apparently quiescent running ear has often been mistaken for typhoid. A negative Widal reaction, a high polymorphonuclear percentage and a marked leucocytosis should throw doubts on the latter diagnosis.

Meningitis. In acute cases there is a marked leucocytosis. In tubercular meningitis the leucocytosis is marked in the later stages.

Abscesses: Epidural, Subdural, Cerebral and Cerebellar. Marked and increasing leucocytosis in the early and progressive stages, the polymorphonuclear percentage depending on the virulence of the infection.

CONCLUSIONS.

The main value of the blood examination in suppurative diseases of the ear lies in the leucocyte count, simple and differential. It is necessary to make repeated examinations to determine the progress of the process. Clinical symptoms must be given greater weight than the mere leucocyte determination. In deep suppurations such as lateral sinus thrombosis without mastoid symptoms, blood tests are invaluable. Blood tests will prevent the faulty diagnosis of malaria or typhoid fever in suppurative diseases of the ear. In doubtful cases we cannot afford to neglect any possible source of light and the examination of the blood will sometimes clear the situation.

40 West 84th St.

DISCUSSION.

DR. PHILLIPS said he believed the field of usefulness of blood examination to be great in suppurative ear diseases, but the clinician should not rely upon such examination for his diagnosis. It should be considered a valuable aid only as it can be substantiated by the actual condition in the ear itself.

DR. KOPETZKY agreed with all the formulae laid down in the paper, but was disappointed that Dr. Hubby did not give a working schedule. He doubted whether blood examination would give any light as to whether the suppuration is confined to the mastoid, or whether it was sinus thrombosis, except in the degree of leukocytosis, evidencing an increase in the suppuration.

DR. FOWLER said that, in a simple catarrhal case or one that is on the border line, it is immaterial whether there is marked leukocytosis or whether there is not, as the treatment is based on the clinical picture presented and not on the blood count, which may be large or small.

In regard to the reduction of hemoglobin, of which Dr. Hubby spoke, Dr. Fowler asked whether it was due to destruction of the hemoglobin by the suppurative process, or to the weakened condition resulting not only from the process going on, but from the diminished food supply. It seemed to him that it might be brought about by the diminished ingestion of food and catharsis. In any event, iron should be used to bring up the hemoglobin.

It would be interesting to experiment as to the production of artificial leukocytosis in connection with the ingestion of certain drugs. Feeding also causes leukocytosis, and pregnancy produces marked leukocytosis. Dr. Fowler asked whether suppurative ear disease is more prevalent in the pregnant than in the non-pregnant; also if irrigation does not produce a local leukocytosis.

DR. THOMSON said he had been particularly interested in blood examination since reading Starr's article about the differentiation between otitis media and its complications, and had begun to have a blood count made whenever possible. While his studies were incomplete thus far, from what he had done he believed the blood count to be of very little value in differentiating mastoiditis from otitis media. In many cases the leucocyte count was increased. In a child it increased to 16,000 and the polymorphonuclears to 79 per cent, without involvement of the mastoid. Dr. Thomson said he was working along this line and hoped to be able to reach valuable conclusions. He was inclined to think, however, that much could be told from the blood count alone.

DR. HUBBY, closing, said that in differential diagnosis blood examination does not seem to be of much value except where there is deep suppuration, as running ear engrafted on sinus thrombosis.

Replying to Dr. Fowler's question, Dr. Hubby said he had not been able to find any data concerning ear disease in pregnancy.

BACTERIOLOGY OF SUPPURATIVE EAR DISEASES.*

BY D. S. DOUGHERTY, M.D., NEW YORK.

While the great importance of the science of bacteriology as an adjunct to the study of infection and suppuration has long been demonstrated, it is of comparatively recent years that its application to, and significance in otology have received the recognition its value should command.

Bacteria, being causative agents of most specific diseases, must necessarily play a particular etiological part in suppurative ear diseases. Even among those diseases whose causative agents are unknown, a complicating suppuration will always show definite forms of bacteria; as, for instance, while the germ of scarlet fever has not been isolated, accompanying suppuration, wherever present, is always streptococcic.

Whatever the causal agent in suppurative processes, it is a surgical axiom, that egress should be provided for the pus, and it is equally important that, when such egress has been made possible either by nature or by surgical means, an examination for the cause of the suppuration should be made at once.

While the results from such examinations are perhaps by no means entirely satisfactory, in so far as they give only the type of organism, it is important to know the exact character of the disturbing agent, as indicative of the probable virulence and future progress of the disease. Any examination made at a later stage is uncertain, as the possibility of secondary infection has to be considered.

Until very recently it was not generally accepted that the normal tympanic cavity was sterile. Since Preysing's observations and results (Otitis Media der Säuglinge) it is conceded that the presence of microorganisms in the tympanic cavity constitutes, per se, a pathological lesion.

Schwartz and Grünhert advance two probable theories for this normal sterility, claiming it is caused either by reason of the bacteriocidal qualities of the tympanic mucous membrane or by the action of the ciliated epithelium of the Eustachian canal, the wave motion being directed outward from the tympanum.

* Read at a Scientific Meeting of the Surgical Staff of Dr. Wendell C. Phillips' Clinic, Manhattan Eye, Ear and Throat Hospital, New York, April, 1906.

Let us, therefore, briefly consider the routes through which infection may assail the middle ear. In doing so, we must primarily divide our cases into two classes; those in which the drum is intact, and those in which it is perforated. In the first class, the routes are through the blood and through the Eustachian tube; in the second class we have, in addition to these routes, that through the external auditory canal.

In infection through the blood, certain specific diseases always occasion the causative factor of the suppuration. In infection through the tubes the general condition of the throat, the existence of excessive lymphoid tissue in the rhino-pharynx and the presence of hypertrophied tonsils play the most important part. To an audience of rhinologists and otologists, it is unnecessary to emphasize or dilate upon this latter fact. The relation between pharyngeal hypertrophies and ear suppuration, and the danger and possibilities of systemic infection through tonsillar portals are generally understood and accepted.

W. H. Park (Bacteria and Protozoa) lays it down the fact "that when enough bacteria are introduced into the human body to overcome its inherent resistance, they produce disease." In the ear this suppuration takes on a specific type, being limited to mucous membrane and bone; we find not only bacteria as such, but also the results of necrosis of bone and destruction of mucous membrane tissue. This is especially true in cases clinically characterized as chronic.

While the bacteria found in the pus of suppurative otitis media are numerous, but few have any important bearing as diagnostic or prognostic factors. Phillips (Archives of Otology, 1903) in an interesting paper on the "History of Bacteriological Examinations in Suppurative Otitis Media" mentions at length some twenty-one varieties.

Funk (Amer. Med., 1901) states their frequency of occurrence to be in the order of 1st, pneumococci; 2nd, streptococci; 3rd, pyogenic staphylococci; 4th, Friedlander's bacillus, and 5th, diphtheria bacillus.

In the examination of a large number of cases in the New York Polyclinic Laboratory, Jeffries found practically the same results; mentioning in order pneumococci, streptococci, staphylococci and tubercular bacilli. Both lay stress on the uncertainty of examination of the pus alone for the tubercular bacillus.

Hastings (Amer. Jour. Med. Sciences, July, 1905) in a report of cases from the New York Eye and Ear Infirmary, says: "In the canal discharge diplococci were found in 49 cases, streptococci in

39, pneumococci in 37 and a mixed infection in 43 cases. Influenza bacilli were found in only two cases, and in two cases the spirillum of Vincent were found. Of the 69 cases where the mastoid pus was examined, streptococci were found in 50% and pneumococci in 29%. Unfortunately the value of Hastings' report is somewhat destroyed by no mention being made of the age of the patients (i. e., whether children or adults) nor of the possibilities of secondary infection having taken place.

Based upon authorities too numerous to mention, we find bacteria standing in the following order of relative virulence, streptococci and pneumococci, it being unnecessary to consider the others in this regard. All are modified by the resisting power of the patient and the condition of the tissue with which they are surrounded. MacEwen (Pyogenic Diseases of Brain and Spinal Cord) calls attention to the possibilities of diplococcus intracellularis meningitidis, especially in mastoid complications.

The destructive ravages of the streptococcic infection and its clinical significance is strongly emphasized by Phillips (Archives of Otology, 1903) and Dench (Amer. Med., 1901).

In a paper such as this it would be manifestly impossible to detail the given bacteriological findings under all conceivable cases, and we must limit ourselves to such deductions as give the best possible practical results.

From the mass of material on hand we deduce the following:

Bacterial findings from discharges in children under five show in the larger majority of cases pneumococci, whether acute or chronic. Among all other cases there is no constant definite agent found (Preysing, Otitis Media der Säuglinge). Acute cases have shown with a fair degree of constancy a mono-microbic invasion, the type of the microorganism being immaterial. Poly-microbic results of examination indicate almost invariably either chronic suppuration or a secondary infection. In this connection, Leutert asserts that poly-microbic findings are an indication of chronicity from the start, and should be regarded as such in prognosis and treatment.

While it is important that a thorough bacterial examination should be made in every suppurative ear case coming under observation, it is too often neglected through a misunderstanding of the knowledge and material needed for such examination, which is generally taken to mean an exhaustive knowledge of bacteriology and the employment of a laboratory, with its extensive appliances. While such conditions are ideal, and while the information furnished would un-

doubtedly enhance the scientific value of the examination, results of benefit to the patient and of clinical significance to the otologist, can be obtained with but little pharaphernalia and comparatively elementary knowledge.

A microscope, a few slides, a bottle of alcoholic solution of methyl blue and a spirit lamp constitute the laboratory equipment and the ability to distinguish a monomicrobic from a polymicrobic field and recognize two or three types of microorganisms the mental.

Now just a word in regard to the technique of obtaining the smear for the slide. The same specialist who carefully and conscientiously takes a culture from a throat, fearful lest his swab touch and be contaminated by the tongue and lips, will plunge a pledget of cotton into the external auditory canal, regardless of secondary extrinsic invasion.

To be of real value, the pus should be taken from the tympanic cavity as far as possible. In the case of suppurative otitis with imperforate drum, the pus adhering to the paracentitis knife is best and sufficient. The external auditory canal should, as a matter of course, be thoroughly cleaned and dried before paracentesis. In cases of perforate drum, where the incision is made for enlargement of perforation, the same method may be pursued, and in cases of large perforation, a flat sterile probe carefully introduced into the tympanic cavity and as carefully withdrawn will produce enough material for a stain.

In conclusion, we would say: That bacteriological examinations should be made, at least as far as indicated above, in each and every case; that a monobacterial invasion points to favorable prognosis in acute conditions; that a poly-microbic invasion, variety of germ being immaterial, points to chronicity and indicates operation as soon as necrotic areas can be demonstrated by probe or other technique of observer; that bacteriological findings give no absolutely definite evidence, the case often running a course diametrically opposite to that expected. Finally, we must remember that the microscope and the clinical picture are but complements of each other, and he who relies on the one or the other must necessarily fall short of giving full justice to himself or patient.

257 West 45th St.

DISCUSSION.

DR. PHILLIPS said he had come to believe that the normal tympanic cavity is sterile, and that in some way it has the power to maintain this sterile condition, the presence of bacteria being evidence of some

disease. He believed that in the catarrhal forms of inflammation there is probably a bacterial invasion, but an invasion of milder organisms. Even more virulent types may be present in the blood of an individual without producing the symptoms of septicemia or pyemia, and it is only when other conditions of the patient favor their development that the more virulent symptoms manifest themselves. This is an important subject because so much reliance is put upon bacteriology, yet it is known that the blood may carry virulent bacteria in considerable quantities.

Concerning the routes of invasion Dr. Phillips said he had taught for years that the principal avenue of entrance of infection into the tympanic cavity is through the Eustachian tube. He believed this to be the mode of entrance in 90 per cent of cases. Bacterial invasion may take place, however, through the open tympanum and through the blood. Two other modes of infection, not mentioned by Dr. Dougherty but recognized by many observers to be possibilities, are through the lymphatics and the mechanical boring of the pus from nearby foci.

It is generally conceded that the streptococcus is the most virulent type of organism, and in all probability the pneumococcus is next, though for some years he had believed the diplococcus intracellularis meningitidis, or Weichselbaum's intracellular diplococcus, to be a very virulent form.

He agreed with Dr. Dougherty that in acute cases the bacterial invasion is mono-microbic in the majority of instances. In chronic cases there is always a mixed infection.

Dr. Hubby emphasized the importance of making the tests mentioned in all suppurative cases and said he had begun the practice of doing this in the Manhattan Eye and Ear Clinic. In every case a smear is sent to the laboratory, and the prognosis and treatment are based largely upon the results of this examination. There seems to be so much difference of opinion, however, with reference to prognosis in mixed infection cases that he had been unable to formulate any idea in regard to prognosis.

Dr. Kopetzky agreed, in the main, with the points brought out in the paper. In connection with the theory of invasion, he called attention to the role that the adenoid plays as a protection against the invasion of the tympanic cavity in children under five years of age. In the adult the Eustachian tube is closed except during the act of swallowing, while in the child it is open, and the ruthless removal of adenoids leaves it patent. It had occurred to him in

noting the different cases that come into the hospital to ask how long after the adenoid operation the ear began to run, and in children under five years of age it often followed the operation. If the loose connective tissue which has not yet been differentiated from pathological adenoid tissue is removed it paves the way for many a tympanic invasion which would not have occurred had the normal adenoids not been removed.

Referring to Dr. Dougherty's technic, Dr. Kopetzky cited a case in the hospital in which an incision was made with the knife and a mono-microbic infection found upon examination. While under observation a second examination was made, a probe wrapped in cotton being employed, and a poly-microbic infection was found.

Dr. Kopetzky did not agree with Dr. Phillips concerning the bacterial nature of catarrhal otitis; he believed it to be non-bacterial, simply an exudative stage, bacteria not yet having entered.

He did not know whether Dr. Phillips, in speaking of the lymphatics as an avenue of invasion, meant through the cochlea. It is not infrequently the case that in meningitis, where the ear is continuously under observation, the patient is deaf when the meningitis subsides. Infection takes place in the following manner: From the meninges, through the perilymphatic spaces to the cochlea, here destroying the organ of Corti, before evidence of its destructive presence is manifest at the ear drum.

Dr. Held called attention to a club-shaped bacterium, a little larger than the diphtheria bacillus, which he had noticed from three to six months after acute suppuration, or even in chronic suppuration, of diphtheritic origin.

Dr. Fowler asked why, if the diplococcus intracellularis is so virulent, as suggested by Dr. Phillips, otitis media does not more frequently result.

With reference to ears running after the removal of adenoids and tonsils, Dr. Fowler asked if it were not more often due to the fact that latent suppuration exists which is lighted up by the removal of adenoids. He had noticed this in children who had previously had running ears, but not in other children.

The method of getting smears, mentioned by Dr. Dougherty, impressed him as an excellent one, but he suggested that it might also be well to get them from the canal.

He had always held that the moment a catarrhal inflammation becomes infected by bacteria, it thenceforth becomes purulent. In

other words, that it was the presence of the pathogenic bacteria which made the inflammation purulent.

DR. PHILLIPS said the diplococcus intracellularis of meningitis is not so virulent except when in contact with a serous membrane.

That catarrhal invasions of the tympanic cavity are of bacterial origin could be proved by the simple statement that a large proportion of invasions of the nose and nasopharynx are catarrhal, without pus, yet the pus-producing bacteria are present.

DR. DOUGHERTY was of the opinion that the order of virulence of the different organisms is largely a matter of the individual making the examination, one microscopist finding the order one way and another another way; but taken as a whole the order of virulence is as expressed in the paper, the streptococcus being the most virulent, the pneumococcus next.

He had not taken up the matter of infection from some other part through the lymphatics, the time being hardly long enough to enter into such details.

With reference to Dr. Fowler's suggestion that pus from the external auditory canal should be examined, Dr. Dougherty said that in looking for the cause of suppurative otitis media it would be found in the tympanum and nowhere else.

He called attention to the fact that in speaking of the removal of tonsillar and adenoid tissue he specially referred to hypertrophied tissue. The lymphoid tissue of a child five years old might be called normal tissue, but as the child grows it may become hypertrophied, in which event it should be removed in order to free the breathing. It might then be called abnormal. Pathologically speaking he could not tell where the normal tissue ends and the hypertrophied begins, but he did not believe the latter begins at the age agreed upon by many rhinologists.

LUMBAR PUNCTURE. ITS CLINICAL VALUE IN THE INTRACRANIAL COMPLICATIONS OF SUPPURATIVE OTITIS MEDIA.*

BY S. J. KOPETZKY, M.D., NEW YORK.

The medical profession was given the procedure knows as Lumbar Puncture by Quincke, and from its introduction into medicine, this method has commanded so wide a divergence of views, both in the field of therapy and as an aid in the art of diagnosis, that it has become a veritable bone of contention, not alone among otologists, but also among the general medical practitioners. At first a therapeutical measure, it was nearly recognized as affording a source from which to gather data to draw inferences to clear up doubtful diagnoses.

During the first period of intracranial complications of middle ear disease, at a time when judicious interference might perhaps save the patient's life, diagnosis frequently presents enormous and even unsurmountable difficulties. Before an audience of otologists such as this, it is hardly necessary for me to enumerate the intracranial complications of suppurative otitis media. Meningitis in all its pathological types, sinus thrombosis, and brain abscess are complications unfortunately within the experience of all. Besides these, there are a series of symptoms occasionally observed in the course of suppurative middle ear disease, especially in children, sometimes in adults, which simulate either simple or tubercular meningitis, and brain abscess. In these cases no inflammatory lesion is supposed to exist, and to this symptom complex, the term "meningismus" is restricted. Serous forms of meningitis are not included in this term (Dupre I Congress Franc. de Med. Lyons, 1894) also (Soc. Med. de Hop. de Paris, May 4th, 1900). (Gellè, Massen, Mignon, Chavasse, Soc. de Otologie de Paris, Feb. 5th, 1902.)

For the development of meningismus, hysteria and neurasthenia have been held accountable, and Lermoyez attributed it to reflex symptoms from a suppurative inflammation of the labyrinth. Dopter (Bul. et Mem. de la Soc. med. de Hop. de Paris, 1902) observed meningismus in typhoid cases. These then, are the conditions which when complicating middle ear suppurations we seek to differentiate from one another, and in which we look to the results

* Read at a Scientific Meeting of the Surgical Staff of Dr. Wendell C. Phillips' Clinic, Manhattan Eye, Ear and Throat Hospital, New York, April, 1906.

of spinal puncture for information upon which to base therapeutic procedures.

The technique of the examination of the spinal fluid is to be found in many text books, and it will suffice for me to say that the essential points of this examination are: the pressure under which the fluid is obtained, its coloration, the bacteriological findings, cyto-diagnosis, and finally the determination of the chemical characteristics and cryoscopy.

The degree of pressure is easily recognized, without instruments, by the strength of the spurt, and the height of its curve. Slow evacuation, drop by drop indicates hypotonia, whilst a fountain spurt, the patient meanwhile in a recumbent position, evidences rise of pressure. Pressure is subject to considerable vacillation in the same patient, and during the same posture depending upon the position of the head, cardiac pulsation and respiratory activity. (Reiken *Deutsch. Arch. f. klin. Med.* Vol. 56, 1895.)

According to Quincke, pressure rises in grave inflammatory conditions, in tubercular meningitis and in brain tumors; the highest observations recorded are those in tubercular meningitis and acute hydrocephalus. The diagnostic importance of pressure is however, a limited and secondary one, Quincke himself admitting that the height of the pressure does not indicate the nature of the lesion.*

For the summary of characteristics obtained from the colorations of the cerebrospinal fluid, Sicard proposes the name of Chromodiagnosis. He considers this part of the examination as very reliable and instructive. Unfortunately the cases with distinct modification of color are the least obscure clinically.

Wentworth (*Boston Med. & Surg. Journ.* 1896, and *Arch. of Ped.* 1896) suggests careful comparison of the fluid received by puncture into a test tube, with distilled water contained in a similar tube. The normal appearance of the fluid may be altered by the accidental or pathological admixture with blood or microorganisms. Blood is easily recognized. Leucocytes contained in the fluid cause a characteristic turbid appearance, although there is a record of an observation by Braunstein wherein the fluid was cloudy without hyperleukocytosis or other formed constituents, probably as a result of unrecognized chemical change.

Speaking generally, coloration is affected in acute meningeal inflammation, although exceptionally the fluid may remain clear. The discoloration varies in acute bacterial meningitis from almost clear, to a greenish yellow, and from the slightest trace of cloudiness to a

* Since this article has been in press a publication by Quincke has somewhat modified this view. (Quincke: "Vortraege ueber Praktische Therapie." Heft 8.

well defined purulent turbidity. The fluid will be found, usually, clear in chronic meningitis, occasionally it may be greenish yellow. (Widal.) In tubercular meningitis, Widal reports it clear, sometimes opalescent, while on the other hand Wentworth always found it more or less cloudy.

Bacteriological examination of the fluid includes direct investigation, cultures, and inoculations. Upon this method, the greatest attention has been laid since the introduction of Lumbar Puncture. Nearly all forms of microorganisms have been demonstrated in the fluid. Diplococci are especially common in affections of the spinal meninges; but true gonococci are rarely found.

Weichselbaum's diplococcus intracellularis, the accepted causal agent of cerebro- spinal meningitis settles the diagnosis, when found. This is generally demonstrated without difficulty and may be distinguished by culture methods from the micrococcus catarrhalis, which is more easily grown at a lower temperature, and upon all kinds of culture media. In otogenic infections, arising from a pathological process in the region of the ear, there may be no microorganism at all in the spinal fluid. (Hastings, N. Y. State Med. Assoc. Meeting, May, 1904.) Kroenig (Verhandlung des XVII Congress f. Innere Medizine, 1899) demonstrated granular detritus, nerve fibers containing myelen and blood crystals in the microscopical findings from the fluid. He examined the fluid of four cases during life which subsequently came to autopsy, and his diagnosis, previously made by puncture, of cerebral foci of softening with rupture into the sub-arachnoidal space was borne out by the post-mortem findings.

Stadelman has shown that bacteriological findings, notably the tubercle bacillus depends largely upon the observer's skill, consequently he considers only positive findings of diagnostic value, and with this view Breuer coincides.

In acute cases, where medical or therapeutical inferences must be prompt because of imminent danger to life, the direct examination is the only method of practical use. Culture and animal inoculation presuppose so much time, that these procedures are adaptable only to chronic cases; and with these the otologist rarely comes in contact. Bacilli are to be sought on the fibrous threads which form in the tube after standing, or after centrifugation of the liquid. The tubercle bacillus has raised much discussion. Absent in some cases, the variable results are explained by the different methods employed by the respective observers. This absence of tubercle bacilli may

be due to the fact that the meningeal tubercles have not broken down, or that they are limited to the cranial meninges, or that the communication between spinal and the cranial cavities is clogged, or that the puncture needle has penetrated into the sub-dural space. This opinion, held by Stadelman (Grenzgebiete f. Med. & Chir. 1897,) is plausible for certain cases, but less satisfactory than the explanation of negative findings by reason of faulty technique.

When found, the tubercle bacilli are always present in small parts. A warning that every rod, retaining the stain after application of Ziehl solution and sulphuric acid discoloration, should not be considered as Koch's tubercle bacillus is sounded by both Griffin and Philbert.

Regarding culture methods, the advantage of conclusive results is offset by the delay in appearance of the cultures (2-3 weeks). This prevents the practical application of the culture for diagnostic purposes in the majority of intracranial complications of middle ear disease. Cultures, may moreover prove a failure because the medullary canal did not share in the inflammatory process, or because the fluid itself has bactericidal properties preventing the preservation of bacterial vitality and virulence, or because the bacteria present have become independently attentuated (Leutert, 1897).

Both pneumococcus and meningococcus are feebly virulent in the purulent exudate of meningeal inflammation, and they yield no culture for from 8 to 10 days after the onset of the disease. (Concetti, XIII International Congress of Med. 1900.)

Animal innoculation is of special value for the demonstration of the tubercle bacillus, but the method demands at least three weeks time. While the method has been successful in itself for the demonstration of the organism, the answer from the laboratory comes of necessity so late, that in cases under suspicion, the paralytic phenomena of the final stage will brutally precede and confirm the suspicion.

For purposes of diagnosis, the chemical character of the cerebrospinal fluid is indifferent and devoid of practical value in ordinary cases. The normal reaction is alkaline, presenting a considerable proportion of sodium chloride and containing neither fibrinogen nor fibrine ferment. In meningeal inflammation, the albumen increases, especially in the suppurative forms, when it may reach from 7 to 9%. In such cases, however, the diagnosis can be made by the gross aspect of the fluid. Daskowitz-Korybut believes that more than one per cent albumen points to inflammatory processes, and should be

understood to contraindicate tumors. Reicken holds that the average albumen in tubercular meningitis is 2%.

Fuchs (Die Therapie der Gegenwart, Vienna, 1904) believes that there is still much room for improvement in the technique of the physical and chemical methods of the examination of the spinal fluid. He attaches great importance to the determination of the freezing point and electrical conductivity. The constant rising of the freezing point in all forms of meningitis, and the disturbance in the relative value of the electrical conductivity and the freezing point, he interprets as an alteration in the relative proportion of organic and inorganic constituents, which he believes occurs in meningitis exclusively.

The determination by cryoscopy of the osmetic tension of the spinal fluid means the establishment of its coagulation point as compared to that of blood serum, and has found employment by Sicard, Widal and Revaud. This procedure necessitates special instruments and Bard (Comptes Rendue de la Soc. de Biologie, Seance, Feb. 16th, 1901) prefers haemotolysis according to the Hamburger method for determination of isotonicity of saline solutions. This latter consists in trying if the cerebral fluid is stained by a few drops of blood added to it after centrifugation. In the normal state, cerebrospinal fluid does not "leak," but leakage occurs when it is in a state of hypotonia. Bard, however, admits the inferior value of haemotolysis as compared to cytology in the diagnostication of acute forms of meningitis, since it does not materially assist in the differential diagnosis, presenting "leakage" in tubercular meningitis, as well as in slight inflammatory conditions. Interesting as they are from a scientific view exclusively, the results of cryoscopy and haemotolysis, up to the present are of almost no practical value.

The method of cyto-diagnosis recently introduced by Sicard, Widal and Revaud (1900) consists in the histological study of the cellular elements contained in the fluid; this study being based on the determination of the number and nature of the formed elements found. Remarkable practical results have been obtained by this method which Wentworth had suggested in 1896, and Bernheim and Moser in 1897, for the study of meningeal affections. By means of cyto-diagnosis, as a routine measure, a certain number of so-called cytological formulae have been established in connection with various cerebral or cerebro-spinal affections.

Normal spinal fluid, or fluid unaltered by general or nervous disease, contains only a few leucocytes, not more than one or two in a

microscopic field. On the other hand, when the meninges are the seat of irritation or inflammation formed elements appear in the fluid whose number and character vary with the intensity and nature of the inflammatory process, representing at once a qualitative and a quantitative reaction. The technique of this method is described in detail in the works of Widal, Sicard and Revaud, and is of easy and practical applicability.

The succeeding microscopical examination must be made with the greatest care and thoroughness, since the leucocytes may be unevenly distributed, being occasionally much more numerous on some slides than on others. The observer must be able to see, differentiate and count the different elements. (Sicard, La Presse Med. Aug. 21, 1901; and La Liquide Cephalo-rachidien, Paris, 1902.)

Lymphocytosis of the cerebrospinal fluid indicates only the presence of meningeal irritation, and therefore does not in itself furnish information as to the nature of the irritating process. Being simply a sign of meningeal irritation, it does not invariably indicate meningitis.

Polynucleosis is the sign of an acute and violent irritation usually found in acute non-tubercular meningitis from various causes. At this stage, the fluid contains almost solely polynuclear leucocytes generally in sufficient amounts to give the liquid a cloudy aspect. At times the fluid appears normal, and the polynuclear leucocytes are only discoverable after centrifugalization. It has been noted of the fluid from cerebro-spinal meningitis especially, that polynuclear leucocytes decrease as recovery progresses, being finally replaced by lymphocytes which in their turn gradually disappear when recovery is completed. (Labbi, Castaignes, Sicard and Bricy.)

Polynucleosis has been occasionaly observed in tubercular meningitis. According to Braunstein, it is often found in suppurative meningitis complicating middle ear disease. Leutert states as a result of his work on the complications of the middle ear disease, that a marked general leucocytosis usually strongly suggests meningitis, an opinion shared to some extent by Lenhartz.

Polynuclear leucocytosis, as always suggestive of meningeal inflammation, had previously been commented upon by Stadelman, Bernheim, Moser, Lichtheim and Wentworth.

Having now briefly stated the methods of examinations, it is well to bear in mind that it is not so much a given characteristic of the cerebro-spinal fluid, but the totality of its examination which should furnish diagnostic indications, and the results of examina-

tions should always be read in connection with the clinical development of a case. Erroneous conclusions are only too easily arrived at in difficult cases where the fluid is examined with a view to substantiate a diagnosis already made, rather than to aid in making one.

Of the various forms of ear diseases, the simple mastoid affections are the only ones which do not cause a modification of the cerebrospinal fluid. In meningismus, the fluid is also normal, according to Widal and Lamauroux. (Bull. et Men. de la Soc. des Hop. de Paris, Jan. 1901 and Contribution a l'Etude de Meningismus, These de Paris, 1902.)

The opinions of observers who have made special study of lumbar puncture varies widely as to the value of *positive* results from the examination of the spinal fluid; meaning thereby a change in the consistency of the fluid, and *negative* findings, meaning a normally constituted fluid.

Stadelman in 1895 considered negative results devoid of value, especially for differential diagnosis between brain abscess and purulent meningitis. Since that time, he has partly modified his views. Braun (Ueber die Lumbal Punktion und ihre Bedeutung fuer die Chirurgie, *Arch. f. klin. Chir.* Vol. 54, 1897), admitted only positive findings for the diagnostication of meningitis.

Leutert, (*Arch. f. Ohrenheilk.* 1899, Vol. 47) and Cheney (Tubercular Men. *Jour. Amer. Med. Assoc.* May, 1905) attach great importance to negative results, for their object is to exclude meningitis.

Grunert (*Arch. f. Ohrenheilk,* Vol. I, 43) agrees with Leutert in trying to exclude diffuse purulent meningitis by lumbar puncture, but lays great stress on the clinical symptoms. Braunstein, summarizing the conclusions of Leutert and others laid down by these latter (Versammlung Deutsch. Natur Forscher Artzt. Zu Hamburg) as follows: A negative result, fluid clear and normal, distinctly excludes the existence of purulent meningitis. A positive result, the fluid turbid from increase of leucocytes, with evidence or non-evidence of the presence of microorganisms, demonstrates the existence of purulent meningitis or of cerebro-spinal meningitis after the meningococcus intracellularis is present.

Stadelman (*Berl. klin. Wochnschr.* 1895) stated ten years ago that the differential schedule to distinguish purulent meningitis, tubercular meningitis and brain abscess is as follows: A clear liquid, clouded up to purulence with various forms of microorganisms, means suppurative meningitis, and a clear liquid without microorganisms points to brain abscess. This summary, although not in-

fallible, represents considerable progress in the diagnosis of intracranial complications of ear diseases. But the advances made since that time in the method of examination of the cerebro-spinal fluid coupled with a wider knowledge of ear complications, permits a new and more generally applicable (although not even yet perfect) schedule, fitting the majority of cases.

According to Chavasse and Mahu (De la Ponction Lombaire dans les Complications Endocraniennes des Otities, Rapport présentée a la Soc. Franc. d'Otol., de Laryngol. et de Rhinol. Oct. 1903), a clear non-coagulable fluid indicates sinus thrombosis, brain abscess, epi, or subdural; simple serous meningitis, meningismus, hysteria and occasionally a circumscribed meningitis. If the fluid comes away in spurts under pressure, the probability of serous meningitis, sinus thrombosis, or even brain abscess is increased.

A clear fluid, without bacteria, or coagulating elements, makes for a probable diagnosis of meningitis, either of the toxic or tubercular variety. A clear, or yellow, or a slightly turbid fluid, with predominating lymphocytosis, indicates tubercular meningitis, provided other causes of lymphocytosis are eliminated when there are no demonstrable tubercle bacilli present.

An opalescent, or a purulent fluid forming a coagulum, with predomination of polynucleosis, and eventually presenting the types of various microorganisms, means acute diffuse meningitis, purulent, or non-purulent cerebro-spinal meningitis provided Weichselbaum's meningococcus is present, and the puncture fluid is withdrawn by aspiration. This type of fluid also occasionally is to be found in cases of circumscribed meningitis.

Apart from the clinical symptoms, lumbar puncture does not give the mathematical certainty of establishing the differential diagnosis between brain abscess, serous meningitis, meningismus, or sinus thrombosis. It is thus shown that lumbar puncture fails precisely for the differential diagnoses of greatest importance to the otologist, also leaving in doubt the question of the existence of circumscribed meningitis.

In conclusion we can merely state that it would be useless to cite the innumerable reports, conflicting in nature, to be found in literature. We must accept these formulae as a working basis and judging them with the clinical symptoms arrive at our diagnosis.

This is the present status of the question of lumbar puncture in Otology.

The Sydenham, 58th St. & Madison Ave.

DISCUSSION.

DR. THOMPSON thought lumbar puncture of great value, though it had its drawbacks. It is harder to perform in private practice than in hospital. It seems a grave procedure and many people will not permit it. On the other hand it is practically harmless. He had seen an accident in only one case in which the cord was exceedingly friable at the point of lumbar puncture. The child had had about six injections altogether. In most cases the procedure is practicaly harmless if carried out properly, and should be used in doubtful cases. He had had one or two cases in which lumbar puncture helped considerably to clear up diagnosis. In one case, the middle ear suppuration had stopped and the diagnosis of intracranial complications was made. It was a case of epidemic cerebro-spinal meningitis.

DR. HUBBY thought that cases wherein the lumbar puncture gives valuable data for diagnosis are those which are clear clinically. In nearly all cases of cerebro-spinal meningitis, the symptoms are so clear that the diagnosis is not difficult. In obscure cases the procedure would be valuable.

DR. FOWLER said the paper served to make him firmer in his opinion that lumbar puncture is advisable only in rare cases. In regard to lumbar puncture having no serious results he could not agree with Dr. Thompson. He recalled one case in particular, a child five years of age, who had nausea, vomiting and collapse. After the second lumbar puncture he thought the child was dying; it had chills, sweating, continued nausea and every other symptom of collapse.

DR. DENCHFIELD said that after all, these examinations are but adjuncts to what the clinical picture reveals. Given a running ear and associated symptoms; the microscope is a valuable aid. He asked if fluid removed from the same individual at different times during the same day would reveal a different condition of affairs.

DR. HELD said that the paper, as he had understood it, was a collection of the opinions of all the men who have been doing work in lumbar puncture and the consensus of opinion as to the relative value of the different fluids, so far as otologists are concerned, in differentiating some obscure conditions.

DR. PHILLIPS said he had recently had two cases of middle ear suppuration with cerebro-spinal meningitis which emphasized the value of lumbar puncture. In the first case, the ear symptoms were rather marked. The mastoid symptoms were not sufficient to

warrant operation, but he operated because those in charge could not account for the temperature, etc. Lumbar puncture revealed the diplococcus intracellularis meningitidis. The patient died, probably from cerebro-spinal meningitis. In the second case he began with lumbar puncture, settled the diagnosis and left the patient alone. With the injections of antitoxin, which gave marked relief, the patient recovered.

He asked whether opinions are given as to the removal of fluid for the relief of pressure, and whether frequent removal of fluid is of benefit.

DR. KOPETSKY, closing, said the entire subject of lumbar puncture had been taken up by him in the American Journal of Medical Sciences, April, 1906, not only as to diagnosis but as to therapeutics and as a means of medullary anesthesia.

He did not agree with DR. THOMPSON with reference to lumbar puncture being practically harmless. In his investigations he had found a number of deaths recorded traceable directly to lumbar puncture. When medullary anesthesia was enthusiastically endorsed five or six years ago he saw a number of cases which served as brilliant demonstrations of the method but in which the patient went into a state of collapse, failing to respond to ordinary stimulation. It seemed, from his study of the literature, to be the concensus of opinion that lumbar puncture should be resorted to only when diagnosis could not be made by other methods. In the article referred to he had given all the references on this subject up to last September. It had been found that in medullary anesthesia, no matter what substance is injected, cerebral symptoms always follow, therefore the idea of dissolving the cocain in the spinal fluid was conceived. The cocain dissolves in the spinal fluid and is at once injected into the canal. This had been found to give the least irritation. All sorts of substances had been injected, with all sorts of results. The spinal fluid could not be sterilized and corroding action would certainly follow the injection at the fourth lumbar vertebra of strong solutions or antiseptics. The only way to increase the bactericidal action of the cerebro-spinal fluid was to withdraw it in small amounts and allow the body to create new fluid to replace that withdrawn. The new fluid contained greater bactericidal properties than that already withdrawn and by repeating the process of withdrawal in the course of three days better results could be obtained than with any known bactericidal agent.

Other conditions of the meninges and cerebro-spinal canal had been treated by evacuation. In hydrocephalus Quincke had with-

drawn 40 to 80 and 100 c. m., until within a week the process was retarded.

Dr. Hubby had said the clinical diagnosis of meningitis could be made; Dr. Kopetsky agreed with this, but said the important question was what form of meningitis the patient had, and lumbar puncture was important to establish a differential diagnosis of the different types. The fluid immediately upon its withdrawal might not show enough formed elements to warrant a diagnosis, in which event a sediment could be allowed to form or the fluid be centrifuged before examination.

ETIOLOGY, DIAGNOSIS AND TREATMENT OF AURICULAR CHONDRITIS AND PERICHONDRITIS.*

BY L. J. DENCHFIELD, M.D., NEW YORK.

Apart from the so-called idiopathic form, found almost exclusively among the male inmates of our institutions for the insane, chondritis of the auricle is almost always of traumatic origin. We say, apart from this idiopathic form, and yet, we by no means regard it as certain that even this must not be sought in the same source. For, while we have all kinds of respect for the statements of the great men who assert to the contrary, and give the fullest weight to the facts upon which they rely to substantiate them, still, we must not be unmindful of the assertions of such men as Kirkbride of the great Pennsylvania Hospital for the Insane in Philadelphia, and Curnen of the Pennsylvania State Lunatic Asylum at the Capital of the same State, that the cause must be sought, not in a diseased restiform body, as stated by Brown Siquart, but in a perhaps unknown, unheeded and forgotten punitive blow of an attendant, or a self-inflicted injury on the part of the patient himself.

That there may be, or may have been an idiopathic form of chondritis may indeed be true; but in view of the fact that, in these days of a more gentle care of the insane, they are far less numerous than they were; that, in keeping with the spirit of the age, its clutches were ever upon the stronger man and seldom upon the weaker woman; that its possession was regarded as the sign positive of the utter non-recovery of the mental condition while, strange to say, an equally positive promise of an improvement in the hearing of its possessor; all show it to be a different kind of chondritis from that with which we have to deal. But be that as it may, one thing is sure and that is that with the exception of an occasional case that comes on as secondary to a severe burn or severe frost, the chondritis with its attendant othaematoma, which we are called upon to treat, is always and ever of the traumatic class. The etiology therefore becomes very plain. In males and seldom in females; in youth and early manhood rather than old age; and generally among those who follow some form of the "manly art" is to be sought this affection.

* Read at a Scientific Meeting of the Surgical Staff of Dr. Wendell C. Phillips' Clinic, Manhattan Eye, Ear and Throat Hospital, New York, April, 1906.

A correct diagnosis of any particular case, ought not to be difficult to attain. For, excluding erysipelas, for which by our earlier fathers it was mistaken, severe frostbites and the more or less numerous benign and malignant growths, which fortunately for the would-be diagnostician, bear their own peculiar birth marks upon them; a rapid or slowly rising mass, of the size of a bean or an egg, purplish or of the natural color of the auricle, dense hot and fluctuating to the touch of the examiner with pain and a feeling of a stretching of the surrounding parts to the patient; you have and only can have one thing, viz: "a rapid effusion of blood between the cartilage of the auricle and the perichondrium," in a word, auricular chondritis. Add to this the history of a fall or a blow and in a few unusual cases of a burn from fire or a bite from frost, and the diagnosis is complete.

Differing so radically in reference to the *cause,* it is not to be wondered at that authorities differ so much as to the *cure.* And this is exactly what we find; for some would absolutely do nothing, declaring that to do otherwise is both useless and harmful, while others urge all kinds of applications and manipulations, stopping at nothing less than the laying open of the entire swelling and the utter removal of the whole sack.

And here let me say that we have no sort of sympathy with those who declare that nothing had better be done. To stand idly by, while a throbbing, burning, stretching, pain and pus producing mass goes on to suppuration, declaring that such spontaneous bursting will be less deformity-producing than the clear small cut of the careful surgeon, is to our way of thinking beyond the pale of belief and altogether contrary to what we both see and hear.

By way of *treatment* at least three things demand our attention; viz: a relief of pain, a removal of effusion, and a prevention of all possible deformity. Three things we say, and yet after all these three are but one, and that one thing is that "effusion of blood between the auricle and perichondrium." This it is that causes the pain, throws out the ever increasing effusion and threatens the deformity. Hence a stoppage and removal of this is what by our treatment should be sought. The question therefore is, how can this be done? What are the means by which it can best be accomplished?

By efforts along the line of *absorption.*

Here ice cold or hot water fomentation, with or without the addition of alum or arnica, the old L. and L. wash, or one of the many

modern antiphlogistic pastes may come into play, reducing as they do the measure of the pain by the lessening of the distention of the stretched and ever stretching tissues and to some extent inciting and perhaps aiding mother Nature to an effort at repair. Add a little later to one or more of these twice a day a good thick coat of the tincture of iodine or ichthyol, and you will have done all that can be done by means of this class of remedies and operation. Should however these means of absorption fail, as they in all probability will, then a more direct surgical interference is the only method of avail. But how shall we proceed? What method or methods shall we follow? Shall we make the old-time puncture, thereby giving egress, it is true, to some of the effusion but leaving behind of necessity its coagula? If we do, we shall fail. Shall we resort to the very radical and at one time much in vogue large sweeping semilunar incision along the upper line of the swelling with its subsequent thorough curettment? If we do, we shall be doing what is needlessly radical, too prodigal with the time of our patient, give a very hearty invitation to an ever on the alert secondary infection, and almost infallibly put our already enough-afflicted patient in the way of a deformity for life.

And so we again say: What shall we do? This: Make a small but sufficiently large incision into the lower border of the mass; drain out the contents until the auricle becomes naturally flat, swab out the entire inner surface with an application of carbolic acid which is pure, immediately following the same with a swab of alcohol of the same strength, leave within the newly made opening a small strip of gauze for drainage, and wrap the whole ear in cotton with a gentle even pressure over the formerly swollen part.

Such treatment in the few cases seen by the writer have healed quickly, comparatively speaking painlessly, and practically without any consequent deformity. The only exception to this was when a collodion dressing was substituted for the outer cotton one.

78 West 94th St.

DISCUSSION.

DR. PHILLIPS said he had never seen so many cases of chondritis of the auricle as had come under his observation this year in the clinics at the Post-Graduate and the Manhattan Eye and Ear Hospital. He had never heard this subject discussed in an otological meeting.

DR. HELD said he had seen a number of cases in which the cartilage was split or fractured. This occurred more frequently in

wrestlers than in boxers. There always was deformity, the full amount of which could not be noticed until after about three months. He did not agree with Dr. Denchfield concerning the pain and throbbing, as the individuals rarely complain of pain except at the time of receiving the injury. He had seen a number of cases aspirated with good results, but the injury was slight. He had also seen cases incised, but did not advocate the procedure. He had been trying the high frequency current and ichthyol. He started in with heat for twenty-four hours, then applied ichthyol intermittently for three or four days, and then used the high frequency current. The swelling went down and pressure was maintained. Incision of the lower border of the cartilage and the use of carbolic acid followed by alcohol has proved excellent, but he believed it would be better to employ a moderate amount of pressure afterward; otherwise the ear woud assume its former position and again fill up. As a rule the pressure and the use of carbolic acid and alcohol will excite adhesive inflammation, the cartilage afterward remaining perfectly flat.

DR. KOPETSKY agreed with Dr. Held that incision should not be resorted to in the average case. The only case he had treated at the Manhattan Eye and Ear Hospital was not a success. The man had been treated by a ring-side physician, the fluid allowed to escape and as soon as the thread, or whatever was used, was withdrawn the swelling would immediately return. He simply punctured to withdraw the fluid. It was time enough to employ the carbolic and alcohol treatment when suppuration exists. A large incision should then be made. Dr. Denchfield had given the ideal treatment as applied to advanced cases. If treated immediately, these cases should be aspirated and pressure applied with collodion. When further advanced he would advocate the treatment outlined by Dr. Denchfield.

DR. THOMSON called attention to a class of cases following operations on the mastoid. He had seen many such cases where the chondritis was marked, more particularly after the simple operation than after the radical. He had seen one case in which very severe perichondritis developed. Free incision was made behind the auricle, it was packed, and it did well. In the case to which Dr. Kopetsky referred the technic was faulty. If a large opening had been made behind and drainage maintained, the case would have terminated better than it did. He favored large incision. Small incision, except in very early cases, he believed to be of little value. He would be afraid of too free use of carbolic acid.

DR. KOPETSKY said the case to which he referred was dressed every day. Three incisioss were made, two above, one of which opened the sacculated pocket and a third behind the auricular gland. A strip of gauze passed in through the ear and out this pocket. The scars of the first two incisions have been obliterated; the third is still evident.

DR. HUBBY said that considering the fact that cartilage is little susceptible to bacterial infection antisepsis in early cases was not so important. Of course when pus is present carbolic acid and free drainage are absolutely necessary.

DR. FOWLER believed the treatment should be surgical and that in applying ichthyol and high frequency current one was getting into "fads and fancies." Drainage should be maintained in the most dependent portion.

DR. HELD said these cases in the beginning do not require surgical treatment. There was various degrees of chondritis and perichondritis. Some cases recover with no treatment, but with deformity; in others there is a slight exudate and something should be used to promote the absorption of this exudate without surgical interference.

DR. DENCHFIELD, in closing the discussion, said he had seen at least three cases during the last year. He followed the treatment outlined in his paper and found it efficient. Careful study of all He had tried to make clear the necessity for pressure. He had used the literature having reference to the subject revealed nothing better. collodion only once and had seen it used many times but had not found it of great value.

THE TECHNIQUE OF OSSICULECTOMY.*

BY R. JOHNSON HELD, M.D., NEW YORK.

Ossiculectomy, or more properly the intratympanic removal of the malleus and the incus, together with myringectomy, one of the first of operative procedures known to the specialty, has been recently written up in a paper by Dr. Milton Ballin, wherein he describes the history and development of this procedure from the original of Himly and Astley Cooper in 1800-1804 to date.

At first the operation was performed to benefit hearing in cases of chronic catarrhal otitis media, on the theory that hearing would improve if the sound waves could be brought to pass directly to the promontory and thence to the round and oval windows. Later the operation was undertaken for the cure of chronic otorrhea, with the idea of providing better drainage and to remove the dead ossicles. At present the operation is indicated in cases of chronic suppurative otitis media and also in certain cases of chronic catarrhal otitis media with adhesions or ankylosis.

For quite a period the operation fell into disuse, probably because of the perfection in the technique of the radical mastoid operation, and it was not until the introduction of local anaesthesia in its performance, as first suggested by Neumann of Vienna that the procedure has again become one in general use. Neumann showed that by his method of local anaesthesia, the operation could be performed without pain, hemorrhage or discomfort to the patient, thus avoiding the dangers of a general anaesthetic and not requiring abstinence from daily work or confinement to a hospital. According to his method, the patient is in an erect position, showing the drum and its landmarks in the position in which we are accustomed to seeing them. The absence of bleeding is important, as any know who have performed the operation under general anaesthesia, wherein the field is usually covered with blood. The slight hemorrhage which occurs with the patient in an erect position easily flows from the canal and leaves the field free to the view.

Neumann's method of anaesthetizing is as follows: using a specially devised angular needle to an ordinary syringe holding about thirty minims of the following mixture: equal parts, of a 1% solution of cocaine hydrochlorate, and a 1 to 1000 solution of adrenalin

* Read at a Scientific Meeting of the Surgical Staff of Dr. Wendell C. Phillips' Clinic, Manhattan Eye, Ear and Throat Hospital, New York, April, 1906.

chloride, an injection is made at the union of the membraneous and bony canal and waiting from five to ten minutes for the purpose of completing the anaesthesia, the operation is begun. I have used this form of anaesthesia and found it effective in quite a few cases during the past year. Before that time I had used exclusively, a local anaesthetic composed of equal parts of cocaine, menthol and carbolic acid, a combination anaesthetic which had suggested itself because of its usefulness to anaesthetize the drum during paracentesis. In using this mixture the canal is first thoroughly dried, then four or five drops are put in the canal, the patient's head held horizontally so as to allow the fluid to circulate over the drum membrane.

The technique of this procedure is: thoroughly cleanse the ear and canal with soap and water, then irrigate with a 1 to 4000 bichloride of mercury solution. A local or general anaesthetic being employed, the first step is to remove the malleus, and free it from its attachments. With a slightly curved or sickle-bill knife the drum membrane is incised from the membrana flaccida downward, keeping close to the periphery, first one side then the other, until it is freed from its attachments to the tympanic ring. It must be remembered that the knife should not be inserted too far when the posterior incision is made, as there is always a likelihood of injuring the stapes either by dislocating it or cutting into the oval window. As the membrane is freed some tendency will be observed for it to curl up on the handle of the malleus, and a free and unobstructed view of the tympanic wall is thus obtained. The tensor tympani muscle next receives our attention, being divided at its attachment to the root of the handle of the malleus A right-angled knife is employed, carried well up between the malleus and incus, the cutting edge parallel and close to the handle of the malleus, to avoid injury to the chorda-tympani nerve. The knife is now rotated forward so as to bring the cutting edge at right angles to the handle of the malleus, then downward and the muscle will be divided. This division of the muscle is important, since an attempt to remove the malleus without its division will result in either failure or in fracture of the ossicle at the junction of the head and the handle, resulting in the head remaining in situ in the attic. When this occurs the procedure is rendered very much more difficult to procure the removal of the head. After the muscle is properly divided the malleus is grasped at the upper part of the handle with a strong pair of forceps and drawn steadily downwards and then outwards. The anterior, superior and external as well as the capsular ligaments surrounding the malleo-incudal articulation part easily and require no cutting. Ad-

hesions may require separation with a suitable knife.

The incus will remain in its normal position held there by its ligaments, although occasionally it may become dislodged and drop to the floor of the tympanic cavity, where its removal is easily brought about with the forceps. Sometimes it is forced upward out of view or backward in the aditus, and its removal from both these positions takes place by means of the incus hooks. When the bone is smaller than usual, due to necrosis, it may become wedged in the tympanic orifice of the Eustachian tube and must be dislodged. The articular ligaments break easily and require no cutting. The ossicles removed, careful curettage of the attic is permissible yet not always essential. The dangers of perforating the tegmen or injuring the facial nerve must be remembered by the inexperienced. Curettage of the tympanic ring is often indicated to remove the remains of adherent drum membrane. The hypo-tympanic space requires attention, but care should be exercised for fear of injuring the dome of the jugular bulb, as the covering of the latter is frequently absent from necrosis or from dehiscence. The tympanic cavity is now thoroughly irrigated with bichloride of mercury solution, 1-4000, dried and loosely packed with strips of sterilized gauze, which are left in place for 24 to 48 hours.

The after treatment is various, either irrigations with antiseptic solutions, or local application of appropriate drugs.

While this operation is not always a success, as we all know, its many advantages should in my mind suggest it in almost all cases occurring in adults prior to subjecting them to the radical mastoid operation for chronic otorrhea. Evil effects or after affects are practically nil, although occasionally a slight headache or burning sensation in the ear are brought about which last one or even two days. Cases occur wherein dizziness resulting from disturbance of the foot-plate of the stapes is evidenced. This condition may be avoided by care in the performance of the operation. The danger of injuring the facial nerve and producing paralysis, because of necrosis of part of the Fallopian Canal are slight if care is exercised.

The advantages of this operation when performed under local anaesthesia may be summed up as follows: It permits the removal of the diseased ossicles which are of no further use to hearing and provides drainage in cases of suppuration. The ossicles removed, permits better access to the tympanic cavity for proper after-treatment. The patient may avoid the taking of a general anaesthetic and is not required to remain in bed or away from work or business; the duration of the operation being but 20 to 30 minutes, and many cases much less than this. Suppuration may be practically cured in

the time which it ordinarily takes to administer a general anaesthetic. The operation under local anaesthesia presents the possibility of working on the patient in an erect position and allowing one clearly to see the landmarks of the ear. With this erect position there is no obstructing hemorrhage necessitating constant sponging. The local anaesthetic in this acts as a haemostatic thus in itself being an aid to the procedure. Considering the simplicity and ease with which the operation can be performed and the fact that with it a cure of chronic otorrhea may be effected which has persisted for a long time and resisted all forms of local medical treatment and that by this procedure grave and dangerous radical operative measures are avoidable. I believe that with care and skill in technique one is justified in performing Ossiculectomy on all cases of chronic suppuration coming under his care, no deleterious effects resulting. The measure should certainly be undertaken as a preliminary to the radical mastoid operation, because even in the event of its failure something has been done toward attempting a cure.

The operation should not be performed in children, in nervous people, or in cases of extensive necrosis.

616 Madison Avenue.

DISCUSSION.

DR. PHILLIPS believed the time had come when it should be determined whether a case could be cured by intratympanic or radical operation. He did not think a person should be subjected to the intratympanic operation if there is no hope of cure. The radical operation should then be performed. If there is extensive necrosis of the tissues of the tympanic cavity or a history of previous mastoiditis, there would be little use in attempting the intra-tympanic operation, but in those cases where the symptoms are not so severe it might be employed to advantage. He had always done these operations under general anaesthesia. While local anaesthesia possesses many advantages in these cases he did not believe it would be generally resorted to for some time on account of the discomfort.

DR. HUBBY mentioned two cases in which he had lately operated, one under local and one under general anaesthesia. In the operation under general anaesthesia he could see nothing. The house surgeon was mopping continuously and even then little could be seen. He caught one or two glimpses during the course of the operation. A week later he operated under local anaesthesia. There were only a few drops of hemorrhage, and he could see what he was doing. He used alypin in adrenalin chloride. The patient said there was a good deal of pain, but she stood it. It would be difficult to say just how much pain there was.

Dr. Kopetzky considered neither ether nor ether with chloroform, satisfactory in these operations because they cause a congestion of the head. Chloroform alone does not. He was rather disappointed that Dr. Held did not take up the indications more definitely. If suppuration has existed for some time there is either a breaking down or eburnation. Removal of the ossicles and clearing out the still active suppuration down to the eburnation, or as far as possible, will bring about a cure.

Dr. Denchfield asked if, in giving a general anaesthetic, the difficulty of hemorrhage could be overcome by the use of adrenalin chlorid before the anaesthetic. He supposed Dr. Held, in emphasizing the absence of hemorrhage, had reference to hemorrhage during the operation.

Dr. Spicer said he had had three cases within the past nine months in which he had removed the ossicles, and in one a large polyp. He had no trouble whatever. The one with the polyp recovered entirely and in the others, when last examined, no pus was found. Local anaesthesia was employed and one patient said there was no pain at all; the others said the pain was very slight.

Dr. Fowler called attention to the fact that by holding the head horizontally, as suggested by Dr. Held, only the lower half of the drum would be affected, and that to cover the other part it would be necessary to tilt the head further downward. He thought there was a special syringe for the cases mentioned by Dr. Held. He used an ordinary hypodermic syringe with a long needle.

Dr. Held, closing, agreed with Dr. Phillips that the intratympanic operation should not be employed where there is a previous history of mastoiditis or extensive necrosis. Newman's anaesthetic (equal parts of a 1-1000 adrenalin and a one per cent. cocain solution) gives less pain than others. It should be injected at the union of the membranous with the bony canal.

A specially devised syringe is not necessary. It is nothing more than an aspirating syringe.

It is difficult to determine just how much pain the patient experiences under local anaesthesia. Some will be perfectly quiet, others will not.

Replying to Dr. Denchfield's question concerning hemorrhage Dr. Held said the after-bleeding amounted to nothing. He had reference to hemorrhage during the operation.

SOME OBSERVATIONS ON THE FOSSÆ OF ROSENMÜLLER.

BY THOMAS L. BRUNK, B.S., M.D., DECATUR, ILL.

In March, 1901, a young married woman, Mrs. A. E., aged 22, came to me for treatment of what I diagnosed as hay fever, in which I found both middle turbinates wedged tightly between the Septum and outer walls, a slight deviation of the Septum to the left, and a small posterior hypertrophy. I also found both ears had suppurated leaving both drum membranes adherent to the internal walls of the tympanic cavities.

I removed both middle turbinates and the posterior hypertrophy. This together with a course of medicine directed to the kidneys and to what seemed to be a chronic bronchial trouble, improved her condition very much; so much that in the course of a couple of months I discharged her. In about six months she returned with a hoarseness, which she had had at first, so increased that she scarcely spoke above a whisper. Her nose was in an almost ideal condition and her tonsils were not inflamed nor enlarged. The vocal cords were hyperemic, but there was no lesion in the larynx to which such a symptom could be referred. There was, however, a chronic pharyngitis with the characteristic enlarged glands studded over the oro-pharyngeal wall. I had made an examination of the naso-pharyngeal space when she first came to me and had observed two very strange-looking broad flat plates, of what I mistook for an anomalous growth of bone in the vault, reaching from the upper margin of the fossa of Rosenmüller and the posterior edge of the eminence about the Eustachian tube across the vault to the upper edge of the vomer. The two flat plates from the two sides left a V-shaped space between them, showing the true vault above.

Since I was somewhat puzzled as to the cause of such deep hoarseness with no recent coryza to aggravate it, I proceeded to re-examine the naso-pharynx to see if a cause could be found. I looked at those peculiar bands again, and determined to introduce the index finger and see if they were bony, as they appeared in the mirror. To my surprise, they were found to be adhesive bands that were easily torn asunder with the finger. I followed up the bands into the fossa of Rosenmüller, and again was almost amazed

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to find that the finger sank into a soft granular mass that completely filled both fossæ. It bled freely for about a minute after I curetted them out with the finger. When the bleeding ceased I gave the fossa an application of silver nitrate, grains forty to the ounce, on a long bent applicator, through the mouth.

Such chronic granular inflammatory tissue is an irritant wherever found in the system, and I concluded it had something to do with this severe hoarseness. To my delight when she returned in three days for another application of the nitrate of silver, her voice had greatly improved. After five applications of the nitrate of silver, each time followed with a five per cent solution of campho-menthol in alboline to take away the offensive taste made by the nitrate, the fossæ were quite free from the old granular tissue and adhesive bands. The voice in the course of a month became about normal.

The next case is that of a married woman, Mrs. C. D. C., aged 32, who came to me for the relief of a "sore spot" in the left side of the larynx and slight deafness. There was nothing in the larynx to cause such a sore spot. Nose and tonsils were normal. By post-rhinoscopic examination, I found adhesive bands stretching across the whole length of the fossæ of Rosenmüller with but little inflammatory coloring of the mucosa. It was very deceiving to the eye. The granular matter stored beneath these bands was not to be seen. There was nothing striking about the view to cause one to believe he had seen much of anything that would form the basis of an etiological factor in certain reflex and inflammatory troubles.

Not finding any other cause for her symptoms, I decided to introduce the index finger and break up the adhesive bands. The fossæ proved to be full of the soft granular tissue beneath a bridge of bands. The patient said she could hear the bands snap as they broke off. Silver nitrate was also applied on a cotton applicator and campho-menthol in alboline sprayed into the naso-pharynx and the treatment was complete. In four days the patient called again for another application of the silver nitrate. By that time her throat symptom was gone, and in the course of a couple of months her drum membranes were assuming their original lustre. During this time pneumatic massage and catheterization were given both ears about three times per week.

These two causes encouraged me to watch for these diseased fossæ in other cases complaining of certain reflex symptoms, which I gradually found could be referred to them as the cause. The

results have been so flattering, and in a few cases so nearly magical that it seemed best to present them to this meeting.

Before referring to a number of other cases where the peculiar symptoms will be stated, I wish to discuss this important etiological factor in the naso-pharynx that has been overlooked by other observers and omitted in our text books and literature.

The anatomical relation of the fossæe of Rosenmüller to the Eustachian tubes, and the nose, pharynx and larynx give to them the most commanding position as a first cause in producing secondary inflammation in all these related parts. I have had two cases where the nasal fossæ were large enough to watch the swallowing act and see how it effects the fossæ of Rosenmüller. In both cases, the posterior and internal margin of the fossæ approached and met the posterior margin of the Eustachian eminence. This, to my mind, gave me a clew as to the formation of the granular inflammatory tissue and adhesive bands in the fossæ. I have also in a few cases found the eminence of the Eustachian tubes so large and somewhat swollen that they projected backward into the fossæ impinging upon the back wall of each fossa. In one case I found the cheesy, putrid masses so often found in infected tonsils, lodged in the fossæ where they evidently were formed. All this lead me to conclude that here is a primary point of inflammation due to contact of two mucous surfaces constantly impinging by the action of certain muscles in the parts, or by anatomical deformity, as is found to be the first great cause in the nasal fossæ. In several cases I observed that the oro-pharyngeal wall stood at a considerable angle to a perpendicular plane that stands at right angles to the median plane of the body. This diagonal position extended up into the naso-pharynx causing one fossa to be much narrower than its fellow. In such cases the narrow one was always found to be filled with inflammatory granular tissue and often nearly occluded by adhesive bands. I found, too, that the ear on the side having the greater amount of inflammatory tissue in the fossa was affected in some way more than its fellow. In fact, I now look at the drums first to determine whether the fossæ of Rosenmüller are at fault as the cause. Take a patient that has not noticed that the hearing has been reduced, and if the fossæ are loaded up with the granular tissue, the drum will have the ground-glass appearance, be somewhat retracted, and the light-reflex partially gone. This to me is a sure indication that the fossæ are filled and need the simple operation I have mentioned.

In all cases of otitis media due to infection, I am led to believe that the primary cause lies in a diseased fossa of Rosenmüller. It

being so close to the mouth of the Eustachian tube, infectious microbes easily gain entrance to the middle ear from such a rich culture media as that found in the inflamed recesses of the fossæ.

In fact, I never feel now that I have done my duty in treating acute or chronic otitis media if I have neglected to free these fossæ of their long accumulated granular tissue. The operation depletes the tissues surrounding the mouth of the Eustachian tube, and removes the harboring place for the offending bacteria.

Authorities state that acute otitis media is often caused by colds. This is true, but why is it that only one ear becomes affected in so many cases. I have found that the affected ear is always associated with a badly diseased fossæ of Rosenmüller, which seems to be the real seat of first infection; and this infection and greater inflammation due to the presence of the coryza is carried up to the adjacent tube.

The literature on the fossæ of Rosenmüller is so meager that it is scarcely worth while to quote from it. Bosworth (1) mentions the fossa, once where he describes it as follows: "This fossa varies somewhat in depth in different subjects, although it is usually elongated, and much broader above than below, and is mainly of interest in that in introducing a Eustachian catheter, its point is usually engaged in this depression."

I have thought that it is a mistake to drag the end of a Eustachian catheter over the diseased fossa before placing it in the entrance of the Eustachian canal. Unless the fossa is first curetted out, we are likely to pick up an infection and introduce it into the canal which may prove disastrous to our treatment. We surely should carefully examine these fossæ before placing a catherer in them.

Dench (2) just mentions the fossæ of Rosenmüller once in telling how to find the mouth of the Eustachian tube; he says: "Behind this we observe the fossa of Rosenmüller." He makes no mention of any diseased condition of the fossæ or of its relation to other diseases or reflex symptoms. In speaking of the cause of acute salpingitis he says: "The chief predisposing cause is some obstructive lesion of the nose or naso-pharynx. The presence of adenoid vegetations is a particularly potent factor in its causation. The presence of this soft tissue in the vault of the pharynx affords lodgement to pathogenic bacteria, from which locality they easily find their way into the canal." Here he states the exact philosophy of the cause, but it applies to the fossæ of Rosenmüller far more often than to adenoid tissue in the vault.

Bishop (3) does not mention a word about the fossæ, though he refers to a plate showing one. He does say significantly under etiology of acute otitis media, "This affection most often results from a cold in the head, and may be caused by inflammation of any portion of the upper respiratory tract and by eruptive fevers."

I am of the opinion that the cause of eruptive fevers having such bad sequelæ in some ears and not in others is due to the fact that these fossæ in the bad cases are full of this granular tissue before the fever begins, which gives the microbe producing the eruptive fever an easy foothold and also holds the infection close to the mouth of the Eustachian tube.

Shurly (4) merely mentions the location of these fossæ, but does not say a word about any pathological condition found in them. In speaking of the causes of chronic pharyngitis, he mentions hereditary predisposition and stomach troubles as the principal ones, but also says that authorities do not agree as to the real cause. "Therefore," he says, "the etiology is rather obscure." My observation is that chronic pharyngitis is a positive sign of some lesion in the nose or the naso-pharynx, and in obscure cases the fossæ of Rosenmüller will always be found diseased. To my mind treating this disease on the oro-pharyngeal wall and not treating these or any lesion in the nose is far from scientific, and will always be barren of good results.

Wright (5) in his recent book does not mention the fossæ of Rosenmüller. Under chronic naso-pharyngitis, he names the whole list of causes familiar to us all, but never once refers to the polypoid growths and adhesive bands, found in these fossæ in every case of chronic inflammation of the naso-pharynx.

Barr (6) says the predisposing cause of purulent otitis media is especially adenoid vegetation, but does not mention the specific cause found in these fossæ. In fact, all the writers I have examined are rather indefinite in stating the etiology of otitis media both acute and chronic.

Another writer (7) in referring to treatment of middle ear disease prefers to remove "slight adenoids situated around the orifice of the Eustachian tubes." It seems that many writers find adenoid growths scattered all about the naso-pharynx. I have found enlarged glands on the posterior margin of the Eustachian eminence as large as half a small bean and about the same shape, but never adenoid growth in any place but the vault of that space. Trautman contends that adenoid vegetations never have their origin in

Rosenmüller's groove in the immediate neighborhood of the tubal ostium. B. Frankel, Shaffer and others have contended that such origin is frequently found.

Pierce (8) of Chicago refers to a cut which, he claims, shows adenoid growth growing directly from the Rosenmüller groove.

From my observation, there may be found enlarged single glands that look and feel like those on the oro-pharyngeal wall, but filling the fossæ outside of these glands is a true granulation tissue that is very soft, vascular and easily removed by the index finger. It is not adenoid tissue. Adenoid tissue is far tougher and more resistant.

I might say here, in operating on these fossæ, the operator should stand behind the patient with the thumb of the left hand on the teeth of the lower jaw to hold the mouth wide open and prevent biting of the right index finger which is to be introduced. This finger is made sterile and introduced high up into the vault, then with a downward sweep with a side of the finger behind the Eustachian eminence the soft tissue is followed down below the eminence as far as it is to be found. The deepest portion of the fossa just behind the eminence should be gone over once or twice more till the bottom is reached. This should be done with guarded pressure, as it is a very tender region, as the writer has learned by doing this operation upon himself. Both fossæ can be curetted in a few moments before the finger is withdrawn.

I have devised a new curette which has not as yet been made, as I believe the best results are attained with the finger. The following are some of the more interesting cases I have had:

Dr. F. E. F., a dentist, aged 34, complained of having hoarseness quite frequently. He had no other lesion in the upper air passages aside from the granular masses, and adhesions in the two fossæ. After a finger curettement and treatment, his hoarseness left him in less than twenty-four hours and has not recurred.

W. O. S., a young man referred to me by Dr. Pierce of Earlville, Ill., complained of a lump in the throat for the past seven months. It seemed to him that it should be swallowed and he performed the act of swallowing quite often to get rid of it. Aside from the fact that the epiglottis stood at an angle of about 20 degrees to the posterior wall, and a slight infection of the small left tonsil, his throat was normal. The left fossæ contained large bands on the side where the "lump" was located. These bands and small amount of granular matter were removed and treated as in other cases and the "lump" disappeared.

Rev. E. C. B., aged 38, referred by Dr. Brewer of Shabbona, Ill., complained of his voice growing so tired toward the end of a sermon that it was an effort for him to continue. I found nothing in the upper air passages but the adhesive bands that could be the cause of such a trouble. They were removed with quite a mass of granular matter in the deep part of each fossæ. He reports that his voice has been much improved.

Miss L. J., aged 26, of Bessemer, Ala., came to me complaining that she had been to two other throat specialists, who had been unable by several treatments to stop a sore sensation in the neck below the left tonsil, and an occasional expectoration from the throat of small pieces of calcareous deposits. She had saved one of these small masses to show me. I treated it with hydrochloric acid and the effervescence showed it to be carbonate of lime. There was no indication about the tonsils that such a deposit could occur there. They, in fact, were very small and quite healthy. The fossæ did not show by post-rhinosopic examination any special trouble, as they were healed over by adhesive bands almost completely. But on introducing the finger I was surprised to find both fossæ deep, narrow and filled with a more indurated mass of old granular tissue than we usually find. It took considerable pressure of the finger to get to the bottom. Both sides were curetted at one sitting. Nitrate of silver was applied. She noticed that the reflex sore sensation in the lower part of the throat was gone at once. It is now four months since the operation and one treatment given about four days after the operation is all that has been done during that time. The patient is much pleased over the result. She is not continually attempting to get something from her throat as she was before. This seems to be one of the most convincing cases I have had that showed the fossæ to be the true cause of the trouble, and the nearly magical result from so simple an operation. The diagnosis was really the main feature in the case.

Dr. R. C. Hanna, of Marion, Ala., a young man, came to me complaining of a "big lump" above the palate that he could not swallow. His nose and throat were quite normal, but his fossæ were large, deep and very full of this granular polypoid tissue. In removing it, there was considerable hemorrhage. But as soon as it was out, he said the "big lump" sensation was entirely gone. I gave him but one application of nitrate of silver, and he got so well that he never returned, even after earnest solicitation on my part to take a few more treatments.

H. Y. W., aged 52, sheriff of Perry County, Alabama, came to me with what he thought was a tendency to grow deaf. His hearing was but very little below normal. Left drum membrane somewhat retracted, lustreless, and light-reflex reduced. Right ear tube edematous and scaly. Both tubes were mopped out with yellow oxide ointment and thoroughly cleaned. Nose had a medium sized ridge impinging on the left inferior turbinate. He also rubbed his hand down both sides of his neck and said: "There is a peculiar sorish feeling there." The naso-pharynx was examined and the fossæ were both heavily loaded with bands and granular tissue. The ridge in the nose was removed at the first sitting. A month later the throat symptoms were the same as they were at first. I then emptied the fossæ of the granular matter, and found that on both sides this matter continued down from the fossa in a deep fold formed by the posterior pillars and the pharyngeal wall to about the base of each tonsil. There was considerable hemorrhage owing to the large surface of granular tissue curetted. This is the only case in which this granular matter extended beyond the fossæ. To my surprise the throat symptoms all disappeared and the hearing became perceptibly better. The drum membranes regained their lustre and general normal appearance in less than two months after the work on the fossæ.

These few cases taken from probably about two hundred in my practice will serve to show the symptoms and results of treating the fossæ of Rosenmuller.

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SOCIETY PROCEEDINGS.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Regular Meeting, May 1, 1906.

OTTO T. FREER, M.D., *President.*

Demonstration of the Suction Method in Diagnosing Sinus Disease. By FRANK E. BRAWLEY, M.D. *(Published in full in* THE LARYNGOSCOPE, *July 1906, No. 7, Vol. XVI, page 530.*

DISCUSSION.

DR. WILLIAM E. CASSELBERRY: I would like to ask Dr. Brawley how he manages to maintain a vacuum when he gives a treatment lasting from half an hour to an hour, and whether he has a means of maintaining closure of the palate continuously for any length of time?

DR. BRAWLEY (closing the discussion): In speaking of Dr. Holinger's apparatus, it seems to me the apparatus, such as I have described, is simple, so that nearly everyone who has the Victor motor and pump can use it. The only additional apparatus necessary is a few yards of rubber tubing and glass tubing to complete the outfit.

Dr. Casselberry asked about continuous treatment. I find in certain cases that there is difficulty in getting continuous suction; the velum seems to release during inspiration. It does not interfere with suction.

Dr. Ballenger said he is afraid that this method cannot be carried out for long-continued treatments. I do not recommend the method for long-continued treatments, because I have not had enough experience to talk about that phase of the subject, and as Dr. Ballenger's experience is so much greater than mine, of course he is more qualified to speak of the advantages and disadvantages of the method in that line.

I do not use a mask, for the reason that it is an expensive attachment; it has to have a pneumatic rim to it; it gets out of order easily and becomes smeared with the discharge. It is an unhygienic arrangement, and after you have finished treating a case in which you have used a mask, you have a ring of hyperemia on the nose like that of a drunkard, and in women this would be an objection.

PRESENTATION OF CASES.

Case I. Exostosis of the Middle Ear.

Case II. Sinus Thrombosis Involving Bulb and Thrombo-Phlebitis.

Case III. Necrosis of Temporal Bone, with Unusual Fistula. By JOSEPH C. BECK, M.D.

Case I. The first case I wish to present is the one I showed in the other room, and it is a case of exostosis of the middle ear. The patient, a woman, presented herself June 22, 1905, with the following history: She has had tinnitus in her right ear for a period of several months and some loss of hearing, for which she went to a specialist, who inflated the ears for a month or two. During this time the symptoms were not relieved, but became aggravated, and finally spontaneous perforation resulted with a mucous discharge. About that time I saw her and on examination found the mucous membrane of the inner wall highly congested, with a mucous discharge from the ear, which was quite profuse, and marked diminution in hearing during the few days she was under my observation. Ten days later she developed mastoid symptoms; pain in the back of the ear. I enlarged the perforation in the drum, with no result, and noticing that the deafness was increasing rapidly, I decided to do a simple mastoid operation, which was done with a very gratifying result, in that the discharge ceased after two or three weeks.

An interesting pathologic condition that developed in this patient about six weeks after the discharge stopped was this: that more than two-thirds of the drum membrane disappeared, and at the floor of the middle ear we had a new formation of bone springing up, so that in about six weeks small portions of bone have formed. These particles of bone were hard to the probe and increased in size, until after two weeks they reached the size we now see like a millet seed. They have not increased in size since then.

From a therapeutic standpoint, this case is interesting to me because the symptoms are those of extreme tinnitus aurium and loss of hearing, and it is a question whether the removal of the exostoses from the middle ear will relieve those symptoms. I should like to get suggestions in regard to the further treatment of this case. I have instituted the usual treatment except operative interference.

Case II. I wish to present a second case. The patient is a young man, 18 years of age, healthy parents, whose previous health was good until six years ago, when he consulted a physician on account of impaired hearing in the left ear. There was no discharge from the ear at that time. He was treated by douches. Four years ago he noticed a discharge from the left ear; but there was no pain

previous to the discharge. The discharge became fetid and continued until February 18th, 1906, when pain developed in the ear, after exposure to cold. The mother treated the ear with drops of hot oil; but the pain continued. The next day he called a physician, who recommended irrigation of the ear, and the application of a hot linseed poultice. During this time he developed a chill, followed by a temperature of 105°. The chills became more frequent until there was one every hour, accompanied with high temperature and vomiting. This condition lasted until February 24th, when the discharge from the ear ceased, and the patient became delirious. I was called to see the patient at this time. On examination, I found a scant amount of purulent material in the external auditory canal, with a small perforation high up, involving the upper outer wall of the canal, with considerable tenderness over the mastoid region. There was a swelling below the angle of the jaw, extending along the sterno-cleido-mastoid muscle. The pulse was 140; temperature 105°. I made a diagnosis of thrombosis of the left jugular bulb and acute exacerbation of chronic mastoid disease, with probably some necrosis of bone.

The patient was immediately transferred to the hospital and was operated upon at 9 p. m. as an emergency, without having had the necessary preliminary preparation. I did a radical mastoid operation, exenteration of the entire mastoid, the incision having been made down along the sterno-cleido-mastoid, and exposing the jugular vein as far as it was thrombosed, the upper third. I excised the vein as far as I could towards the jugular bulb, then exposing the lateral sinus by making an incision, as recommended by Whiting until I came to the free sinus, I removed the clot and packed. I finally carried the incision as far as I thought necessary to reach the jugular bulb and the communication between the thrombosed vein. I packed the wound, and put the patient to bed. Temperature the next day was normal, and remained so for two weeks. Two weeks later he developed pain on the right side of the chest, at the base of the lung. This proved to be a pleuro-pneumonia. He recovered from this; then the left side became involved similarly. There was rusty sputum. Examination of the sputum showed a great many pneumococci, so that this was a pneumococcic infection. About two weeks after the pleuro-pneumonia cleared up, this boy developed a sudden chill, with high temperature, pain in the head, with buzzing and loss of hearing on the right side. I anaesthetized the patient the following day, exposed the cerebellar and cerebral regions for abscess but found none, curetted thoroughly the old field of operation, leaving the cerebellar as well as cerebral surfaces

exposed. This large cavity was packed and dressed daily with a pleasant result following, in that the temperature remained normal, and the patient recovered, with the exception that there is at this point a small hernia cerebri and of course marked sagging down of the ear. Besides that, the membranous canal has not been slit open. I did not slit the canal in operating, owing to the fear of perichondritis or chondritis of the auricle.

I took several X-ray pictures of the case to show the bony defect following the operation. They show the hernia cerebri at this point and also the bony defect over cerebellum.

I want to mention the operation on the opposite side. I thought possibly there was some trouble in the opposite ear, so I opened up the antrum mastoideum and found it to be absolutely normal. An interesting point is: that when I found it normal, I allowed the cavity to fill up with blood clot, and sewed it up. We should not drain when we find no trouble, but sew up the wound and try to obtain primary union. Heretofore, when I have drained in this class of cases a long after-treatment has been necessary.

During the time the boy had chills and fever, I administered what I believe is of value in these cases of thrombosis, namely glycogen collargulum in five-grain doses intravenously.

Case III. History: Miss H., 44 years old, with a good family history. Usual diseases of childhood. For the past ten years has been suffering with marked headaches on the right side, back of her ear. I saw the patient with Dr. McLane about four years ago. She complained very much of the pain in her head, dizziness and tendency to falling to the affected side.

Examination: Hearing of the patient was reduced in the right ear to about ¼ for conversational tone; watch was heard on contact; Rinné was negative; Weber laterated to the right.

The tympanic membrane appeared somewhat thickened, but intact, except at the lower inferior quadrant. At the very periphery of the membrane was situated a small perforation, which by inflating the middle ear did not communicate with this cavity. A small amount of pus would be wiped out, and that had an odor of necrosed bone. A probe introduced into this opening gave evidence of roughness of bone. On the side of the neck, along the anterior border of the sterno-cleido muscle, is a long scar, the result of spontaneous rupture of an abscess, which the patient says she has had since childhood.

Diagnosis: Necrosis of temporal bone. An operation was advised and accepted.

In September, 1902, under general anaesthesia, patient was operated upon. The usual post-auricular incision was made. The antrum was exposed and found normal. Then the bony canal was chiseled off, going downward rather than upward towards the existing perforation of necrotic area. One will easily appreciate the apprehension of wounding the facial nerve in this procedure. On locating this focus of infection we found necrosis apparently not very extensive, and after thoroughly curetting it the plastic completed the operation. The result was but partial, in that the headaches were less intense. A slight facial paralysis resulted, but cleared up very shortly. The dizziness, however, persisted, and, in fact, became worse. Patient then left the city and did not return until October, 1905, with about the same symptoms, but the headache was more aggravated and localized to a point back of the mastoid process, about the region of the sigmoid sinus. This point was so tender that patient could not lie on that side of her head and the palpation of it was very painful. On examining the ear, we found the hearing much reduced and at the right of the original perforation was a small granuloma, slight pressure upon which made the patient very dizzy. This symptom suggested labyrinthine necrosis. The hearing tests at this time showed a reduction in bone conduction, and the Galton whistle was not heard well in the higher registers.

I concluded that there was still necrosis of bone, possibly greater than externally manifested, and decided to reopen and explore.

In November, 1905, the old post-auricular incision was reopened and carried somewhat further down the neck. From the upper limit of this incision I carried another semilunar incision back and downward towards the region of the neck, making a flap, two inches wide, and 3½ inches long, with the base at the neck, a sort of a hinge-shaped flap. Then I exposed the mastoid by peeling the auricle forward. The next step was to bring down this hinge-shaped flap, including the periosteum, exposing this very tender region spoken of above. By so doing I obtained a bleeding from an opening just where the great tenderness existed such as one gets when opening the lateral sinus. At first I thought of an emissary vein, but it proved otherwise. The periosteum that was peeled off had attached to it a small piece of bone that corresponded to the bleeding opening and it looked diseased. On further examining the bleeding area, I discovered that it was the lateral sinus, whose bony covering was necrosed, while the sinus itself remained in good condition. The next step was to expose the lateral sinus higher up, so as to compress it temporarily, checking thereby the bleeding, while exploring the diseased area. This was very readily accomplished and to my sur-

prise I found a fistula leading from the above described necrotic area, namely, the bony wall of the lateral sinus, forward, downward and inward into the middle ear cavity—where we had the granulating area, on inspection of the canal.

Leaving the probe in this position, I chiseled down on to it, and nearly through the facial canal, in that manner destroying the continuity of the nerve. The fistulous tract was thoroughly curetted, three strands of silkwork gut introduced as a drain, allowing the cavity to fill up with blood, which clotted and was not disturbed. The exposed lateral sinus was packed and drained, through a separate opening in the skin. The case was dressed on the third day, the silkworm gut drain removed, also the gauze from the sinus, leaving the blood clot undisturbed, in the canal and middle ear. From that time on, only external dressings were changed, and after two weeks the posterior wounds were closed by granulation. After that I noticed a remarkable difference in the wound in the canal and middle ear in this case from other cases where I have been using gauze as a drainage, and finally when the last particle of dried blood was removed the surfaces were almost entirely epidermized.

Result: The headaches and pains of the side of the head disappeared. Patient was able to lie on the right side of her head again. Dizziness disappeared. Hearing improved some. Complete facial paralysis.

NOTE: Since this case was presented, I have performed an anastomosis between the facial and hypoglossal nerves, to correct the facial paralysis. The method was an end to side anastomosis. It is now about one week since operation. The wound has healed by primary union, but, of course, I cannot state anything as to the result at this time. I shall make this plastic part the subject of a special communication.

DISCUSSION.

DR. IRA FRANK: I had the good fortune to assist Dr. Beck in this operation which he has described, and, as he has said, in freeing the periosteum from the bone, pulling down the flap, we thought at the time we had ruptured the emissary vein. But this was not so. Dr. Beck, in following the fistula into the middle ear, spoke of severing the facial nerve, which was done intentionally.

DR. GEORGE E. SHAMBAUGH: In regard to the exostosis shown in the first case reported by Dr. Beck, I can see no reason for expecting any influence on the symptoms the patient complains of by its removal. I see no reason for connecting these symptoms with the exostosis. The exostosis does not apparently spring from that part of the inner wall of the tympanum which is formed by the bony

capsule of the labyrinth. It is the middle and the posterior upper parts of the inner tympanic wall that are formed by the capsule covering the first turn of the cochlea and the vestibule. An exostosis in the lower anterior part of the tympanum is not connected with the capsule of the labyrinth.

In the second case reported by Dr. Beck where he removed a thrombosis from the sinus on one side and eventually operated on the opposite mastoid, I was not able to get clearly his reasons for operating on the opposite mastoid. He stated that there was tinnitus in that ear, but I did not gather from his remarks whether there was any local evidences about the ear pointing towards probable suppurative disease on that side.

The third case reported by Dr. Beck is a very interesting one where in scraping the periosteum off the posterior aspect of the mastoid process he encountered free bleeding from an opening in the bone through which opening a probe was passed forward beneath the facial nerve until it appeared in the tympanum perforating the posterior inner wall of tympanum near the floor of this cavity. I should be inclined to believe that the bleeding encountered while lifting the periosteum from the posterior aspect of the mastoid was from the emissary mastoid vein unless this vein was found at another point during the operation. If I understood the doctor correctly he found the lateral sinus involved and partially thrombosed on this side. A high position of the bulbus jugularis is not an infrequent occurrence, in which case this bulb encroaches on the lower posterior part of the tympanum just at the point where I understand the probe in this case entered the tympanum. It would be interesting to know whether in this case the fistula in the bone through which the probe passed from the posterior aspect of the mastoid into the tympanum did not lead to a thrombosed jugular bulb through which the probe passed before entering the tympanum.

DR. BECK: I would like to have Dr. Shambaugh explain how, after pulling back the periosteum, free bleeding from the sinus took place if he does not think there was some necrosis over the region of the lateral sinus?

In pulling down the periosteum over the posterior part of the mastoid, the emissary vein of the mastoid would be torn, producing bleeding from the lateral sinus unless the sinus was completely thrombosed. A localized necrosis at the point of entrance of the emissary vein could of course be present and would conform with the history of partial thrombosis of the lateral sinus.

DR. BECK (closing the discussion): As I tried to report these three cases in as short a time as possible, I perhaps did not make

myself clearly understood. If the gentlemen had seen the cases referred to when operated upon, they would have understood them better. In Case III the opening in the middle ear was situated low down posteriorly in the floor. The posterior part of the middle ear was rough to the touch of the probe. There was fetid pus, but no bleeding from that point. The operation consisted in exposing the tender point back of the head. I made a tongue-shaped flap, so that the apex of the flap was upward, and in pulling it down free bleeding occurred, a portion of bone or sequestrum having been found attached to periosteum. There was necrosis over the region of the occipital bone back of the mastoid process, where we should expect to find the sinus as it turns down. The question at the time of operation was to try to see whether it was the emissary vein, but we found the sinus farther back, and by compression of the same stopped bleeding. In exposing the sinus I inserted a probe into the former bleeding point, and followed right down to the middle ear. Therefore, there was a fistula that led from this necrotic spot, about the lateral sinus to the middle ear. I exposed the fistula until I came to the middle ear, and there was no bleeding at that point. That was not the jugular bulb, but simply a fistulous tract.

DR. SHAMBAUGH: You had thrombosis to deal with?

DR. BECK: No; I had necrosis about the sinus, with a fistula into the middle ear.

In regard to the remarks made about the operation on the opposite ear, in Case II, I will say that in a case of this kind, where the life of the patient is at stake, and where symptoms are present, as deafness and tinnitus aurium, with symptoms of chills and fever, we do not hesitate in opening the opposite mastoid, even if the drum is perfect. It was a dull-looking drum. There was a possibility of the patient having trouble in the mastoid without any evidence of it in the canal. We know that such conditions are described, and that was my reason for opening the opposite mastoid while the patient was under an anaesthetic.

Concerning the scar, to which Dr. Hollinger referred, this patient (Case II) has a keloid scar along the anterior incision, a keloid formation, another interesting pathological condition in this case.

As to the cavities spoken of, I have seen them in my experience in retention cysts.

A Case of Xanthoma Multiplex, with Interesting Throat Complications. By JOHN EDWIN RHODES, M.D. *(To be published in full in a subsequent issue of* THE LARYNGOSCOPE.)

BOOK REVIEWS.

Diseases of the Ear, Nose and Pharynx.

By D. B. St. John Roosa, M. D., L.L. D.; Professor of Diseases of the Eye and Ear in the New York Post-Graduate Medical School and Hospital; Consulting Surgeon to the Broklyn Eye and Ear Hospital; formerly president of the New York Academy of Medicine, etc., and Beaman Douglass, M. D., Professor of Diseases of the Nose and Throat in the New York Post-Graduate Medical School and Hospital; Fellow of the New York Academy of Medicine, etc. Cloth pp. 621. Price $3.00 net. The Macmillan Company, New York, 1905.

This volume is really a text-book of the diseases of the ear, with quite a full chapter on those diseases of the nose and nasopharynx which may affect the ear. The result, however, is an extremely useful volume, such a one as should be expected from the other works of the authors. The style is clear and concise, and the chief subject of the book is thoroughly treated.

While the surgical affections of the ear and their operative treatment is considered in sufficient detail, still the book is rather characterized by the special attention given to non-operative conditions or to the pre-operative stage of conditions which ordinarily require operative interference. In this particular the book is distinctly conservative.

Diseases of the Ear, Nose and Throat.

By John Johnson Kyle, B. S., M. D., Clinical Professor of Otology, Rhinology and Laryngology in the Medical College of Indiana; Department of Medicine of Perdue University; Otologist, Rhinologist and Laryngologist to City Hospital, St. Vincent's Hospital, and City Dispensary, Indianapolis; Fellow of the American Academy of Ophthalmology and Oto-Laryngology; and Member of the American Laryngological, Rhinological and Otological Society, etc. 12mo; 595 pp., with 160 illustrations, two colored. Full leather, flexible, rounded corners, gilt edges, $3.00 net. P. Blakiston's Son & Co., Philadelphia, 1906.

In this handsome little volume, the author has presented to the profession a very thorough working manual of Ear, Nose and Throat diseases. As the writings of the best authorities on these subjects have been freely cited, the work may be said to express the latest accepted views of this branch of the profession. There has been ample scope for the author's judgment in his selection from this literature; and the contributions from his own experience add greatly to its value.

The opening chapter on embryology is unusually complete and satisfactory and the combined treatment of the anatomy and physiology shows the adaptability of the different parts to their express functions. For the student the chapters devoted to the methods of examination of special instruments and therapeutic agents will be found especially helpful, and to the practitioner, suggestive. Through the succeeding chapters, devoted to the various diseases of these organs, the ear is first considered, external, middle and internal, then the nose and the accessory sinuses, and in sequence the naso- and oro-pharynx, the larynx, and lastly the subject of foreign bodies in trachia and bronchus are briefly presented. The sections devoted to treatment do not aim to give a general summary, but show the methods which in the author's own experience have been found most successful.

In conclusion, it must be said that the purpose of the work, as set forth in the preface, "to give to the student part of the essential information relative to diseases of the ear, nose and throat," has been realized in a clear, concise and happy result.